Simonds Guide

FOR

MILLMEN

5-125 15

SIMONDS MFG. CO.

MAKERS OF

SAWS

AND

MACHINE KNIVES

ALSO

CRUCIBLE SHEET STEEL.

Felix Schwermer.

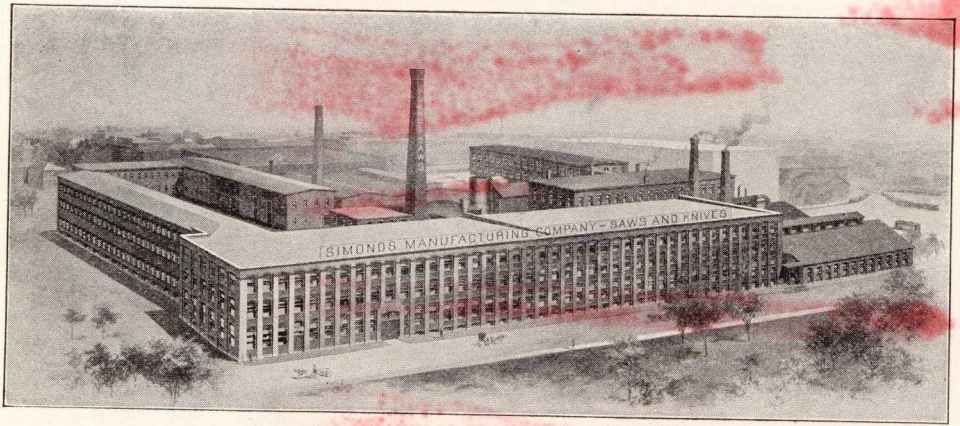
FITCHBURG, MASS. NEW YORK CITY. CHICAGO, ILL.

PORTLAND, ORE. SEATTLE, WASH.

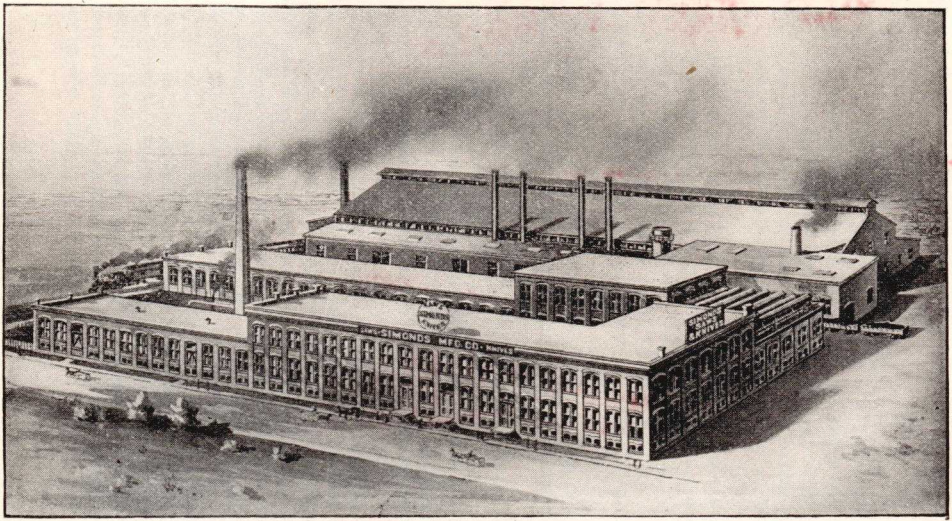
LONDON, ENG.

SIMONDS MFG. CO. LTD., NEW ORLEANS, LA.

SIMONDS SAW CO., SAN FRANCISCO, CAL.



Simonds Mfg. Co.'s Saw Works, Knife Factory, Fitchburg, Mass.



Simonds Mfg. Co.'s Saw Works, Knife Factory and Crucible Steel Plant, at Chicago, Ill.

INTRODUCTION.

IN OFFERING you this treatise on the care and handling of Saws, we aim to separate each kind, and treat each differently, suggesting such rules as have been found to be the most practicable to obtain the best service from the different kinds and styles of Saws.

In the latter part of the book we illustrate the principal kinds of Saws treated on in this work, giving at the same time their list prices. We also give a table showing the standard number of teeth in Circular Saws, both for splitting and cutting-off; also table showing gauge and its equivalent in fractions of an inch, thousandths of an inch, and in millimetres.

We trust that our readers will appreciate our endeavors to bring before them this work, and that same will prove to them a valuable aid in the care and selection of Saws.

There is no manufactured article of which more is required than large Saws for log sawing.

Our improvements have demonstrated that Saws can be made as reliable as the most common article, and we issue this book to explain some of the principles which govern them, that errors may more readily be discovered and corrected.

In presenting this work, we do not wish to give the impression that we "know it all," for we are aware there is no one person who can boast of this knowledge. But, acting on the ground that "two heads are better than one," we submit this work, not as an expression of opinion of a single individual, but rather a grouping together of ideas offered by a considerable number of first class sawyers, filers and millmen, together with our own experience as Saw manufacturers.

It is well known that filers do not wholly agree on what constitutes the best practice in the fitting of Saws. They may not agree on the proper amount of tension, number or spacing of teeth, style of Swage, shape of teeth, or size and shape of gullets, but there is no reason why they should disagree on these points where the same conditions are to be contended with.

There are cases where two filers, working in separate mills, but under exactly the same conditions, handle their Saws, in some respects, in an entirely different manner. While it may be true that each one is equally successful as regards the quality and quantity of lumber sawed, in one case the Saw may be subjected to such a severe strain that it is liable to crack and break at any moment, and in the other case the Saw may be in such condition that it will cut as good a quality of lumber, and as much of it, and do it with much less power, reducing the wear and tear of the shafting, bearings, belting, engine, and, in fact every part of the machinery from which it derives its power, and do the work without any danger of cracking or breaking.

It is almost impossible to make and fit Saws that would be perfectly adapted to the requirements of every case, for there is a great difference in mills and the conditions under which Saws may be required to work. Yet, if when ordering Saws from us, you will give the exact conditions under which they are required to work—namely, the speed, feed, and kind of timber to be sawed—we can furnish Saws that will be perfectly adapted to their work. However, there are cases where Saws are perfectly adapted to the above requirements, yet fail to give satisfaction for reasons entirely foreign to the Saw itself, and it is in a case of this kind that filers sometimes disagree. Where "Saw Doctors" thus disagree, it remains for each one to study the case according to his own light using common sense and intelligence largely, and prescribe the treatment that his Saw seems to need. Care, attention to details, the study of cause and effect, and the use of common sense, must characterize every first class filer.

Since we first began to manufacture Saws, we have kept constantly in touch with those who have used them, and have thus become thoroughly acquainted with many of the troubles incidental to their use, and have made a study of how to overcome them.

Lumbermen of today are straining every nerve to produce a fine quality, and large quantity, of lumber. To do this, mills have been introduced that drive Saws at a high rate of speed, and the feed has been increased in proportion. Consequently, Saws must be made to stand this increased demand upon them, and we claim that if Saws of

our make are treated as suggested in this pamphlet, they will meet requirements in nearly every case.

We have employed our best efforts to become thoroughly acquainted with the requirements of Saws, in order to give our patrons the best that money can buy. We have also given special attention to the inspection of our steel, and the manufacture and inspection of our Saws, and, from the flattering testimonials we are constantly receiving, we believe our efforts have been successful.

From the long and successful experience we have had in the manufacture of Saws, we hope this treatise will present some information that may be applied with advantage, or serve at least as a matter of consideration or investigation.

The quality of steel used, the improved system of manufacturing, tempering and testing, have placed our Saws at the head of all other makes, and gained for them the enviable reputation which they justly enjoy.

We hope mill owners, filers and sawyers, will find it to their advantage to keep this hand book in a convenient place for reference, as it contains a good deal of useful and valuable information.

A Good Mill.

In the manufacture of lumber it is essential to good work that one has a good mill. The foundation should be sufficiently strong to withstand the shock to which it is subjected in turning large logs; the track stringers should be of good sound timber, at least 8″ x 10″. These stringers should be set perfectly level and parallel with the Saw frame, gained into the girders and joists of the mill floor or foundation timbers, and secured by keys and bolts so they will not change position when large logs are rolled against the head blocks. The track irons, particularly the "V" side, should be absolutely level and in perfect line with Saw frame. Where a guide rail is used in the center of carriage, great care should be taken to see that this is perfectly straight and parallel with Saw frame.

Hints to Sawyers, on Ordering, Fitting and Running Circular Saws.

In ordering lumber Saws, the following specifications should be carefully given:

The diameter of the Saws; the gauge at tooth; the gauge at eye; the hand—whether right or left; the number of teeth; the style of tooth desired; the size of eye; size, number, and position of pin holes; speed in and out of cut; the feed—whether steam or friction; the style of fitting to be used, whether spring set, half set and half swage, or full swage.

The Gauge of Saws.

In regard to the gauge of Saws for log sawing, in Saws 42″ and over in diameter, 6, 7, 8 and 9 gauge are used more generally than Saws of thicker or thinner gauge, but there are some cases where extremely thin Saws are used; in fact, there are Saws of our make in use as thin as 11 and 12 gauge, 62″ and larger, both Inserted and Solid Tooth, doing good work, but in such cases the conditions must be most favorable to the use of thin Saws. It is a well known fact that thin Saws are far more sensitive than thicker Saws. In the usual gauges of large Circular Saws used in the ordinary manner on the average feed and lumber, $\frac{3}{32}$ of an inch, equally divided, is about as little set or clearance as can be successfully run, though in hard wood or frozen timber less can be used.

A thin Saw requires just as much set on either side of the plate as a thicker Saw; consequently, in proportion to the thickness of the plate, the thin Saw has the most strain to bear.

It is not our aim to give the impression that we do not make thin Saws, but we do wish to impress upon the minds of our customers who purpose putting them in, the importance of having the conditions favorable to their use. The difference in thickness between 8 and 10 gauge is $\frac{1}{32}$ of an inch. The set for clearance of each being the same, $\frac{1}{32}$ of an inch is all that can possibly be saved in kerf. Between 8

gauge and 11 gauge, the difference is $\frac{1}{32}$ of an inch full. Hence, the saving in the instances above, is very small; so small in fact, that in nine cases out of ten it is offset by a reduction in capacity, or in the quality of lumber sawed.

As to saving in power, in many cases the difference is not in favor of the thinner Saw, for, being lighter, it will deviate from a straight line much easier. Therefore, before deciding what gauge to order, consider well the following: The class of logs you have to cut, the mechanical ability of your sawyer and filer, the condition of your mill and the power you have, and, if all these are favorable, you are safe in ordering a Saw thinner than if they were otherwise.

In cases where boards are sawed exclusively, and you wish to run as light a Saw as possible in order to save lumber, we would recommend at least one gauge thicker at the eye than at the rim. In sawing dimension or any heavy lumber, we would not recommend a taper Saw, as in this class of sawing it is necessary to clear the center, as the thick, heavy timber will bear heavier against the body of the Saw than boards or any kind of thin lumber, causing the Saw to heat at center, thus requiring more set to keep the center from heating. Therefore, it is better to have a Saw of equal gauge, than to be obliged to add more set to make up for the difference between the center and the rim.

The Hand.

To find the hand of a Saw, stand in front of it, with the teeth pointing toward you, and if the log or carriage travels past the Saw on your right hand side, it is a "right hand Saw;" but if on the left, it is a "left hand Saw." See page 10.

Number of Teeth for Solid Tooth Saws.

To decide on the number of teeth required, find out on just what feed the Saw is to run, and, if the feed is 4 inches to the revolution, have one tooth for every inch of the diameter of the Saw—that is, a 60″ Saw with 60 teeth for 4″ feed; and for every additional inch of feed carried, add 10 teeth. In other words, for a 60″ Saw for 4″ feed, have

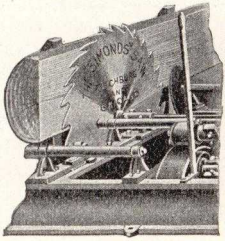
60 teeth ; 5″ feed, 70 teeth ; 6″ feed, 80 teeth, and increase the number of teeth in a slightly less proportion up to any desired amount of feed, but we would not recommend more than 100 teeth for the greatest feed. The above rule applies particularly to pine or any kind of soft timber. For hard wood or frozen timber, where there is sufficient power to maintain a uniform speed, the same rule may be used. But in mills where the power is limited, it is not good policy to have more than one tooth to every inch of the diameter of the Saw, for the fewer teeth there are in the Saw, the less power it takes to drive it.

Where the feed is less than four inches, the same rule can be applied by reducing the number of teeth in proportion to the reduction in feed.

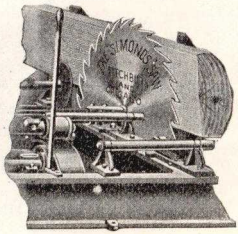
Where a spring set is used, a larger number of teeth is required than where the Saws are fitted full swage.

The above rule applies only to the regular gauges used in log sawing, say 6, 7 8 and 9 gauge. Thin Saws require a larger number of teeth.

Circular Board Saws.



Left-Hand Saw.



Right-Hand Saw.

N. B.—Standing in front of a Circular Saw with the Saw revolving towards you ; if the log passes to the right of the Saw it is a RIGHT HAND Saw ; if to the left, a LEFT-HAND Saw, as shown above.

Size of Eye, and Size and Position of Pin Holes.

To get these accurately, place a sheet of paper on the Collar; or, better still, if you have a Saw which you have been running, place the paper on the centre of the Saw so that it will cover both eye and pin holes, hold the paper firmly in its place over the eye, and, with some hard smooth object, rub the paper over the eye and pin holes until their outlines can plainly be seen on the paper. This will leave an mpression on the paper that will guide the sawmaker accurately.

The Speed of the Saw.

This is a very important matter for consideration, as a hundred revolutions, more or less, will always make a difference in the running of the Saw, yet we know of many cases where the speed varies several hundred revolutions per minute.

It is very important that the speed of the Saw be given when running both in and out of the cut, for a Saw, to run well, has to be tensioned very differently when the speed is well maintained throughout, from what it must be if it makes 600 revolutions per minute out of the cut, and lags down to 500 in the cut; or, as in many mills where the power is deficient, even down to 300 revolutions.

The speed of the Saw is one of the most essential things to be observed in connection with their use, and no one can give this matter too much attention.

Our experience has been that Saws work better running one hundred revolutions below the speed given in the annexed table, than they will when running first one hundred revolutions above, then as many below the proper speed. If your power is too light to maintain the standard speed, run the engine at a higher *regular* speed, put a larger diameter receiving pulley on the mandrel, and the results will be far better as to quality and capacity. This is much better than the throttle plan, even if your speed does fall below the standard, for, while you have increased the regular speed of the engine, you have also increased its power, and, by putting a larger receiving pulley on the mandrel, you have increased the power without increasing the speed, thus securing a more uniform speed.

We can adjust the tension of Saws to overcome a variation in speed if full instructions upon this subject are given us when ordering Saws, but we advise a regular speed at all times. In order to maintain a uniform speed, both the power and amount of feed must be taken into consideration, for, if you undertake to carry more feed than the power can handle, the Saw will lag in the cut, and it will be impossible to maintain a uniform speed.

Speed of Saws Running 10,000 Feet Per Minute.

72	inch,	530	rev.	per	minute	36	inch,	1080	rev. per minute
68	"	560	"	"		32	"	1225	" "
64	"	600	"	"		28	"	1400	" "
60	"	640	"	"		24	"	1630	" "
56	"	700	"	"		20	"	1960	" "
52	"	750	"	"		16	"	2450	" "
48	"	815	"	"		12	"	3260	" "
44	"	890	"	"		10	"	3920	" "
40	"	980	"	"		8	"	4600	" "

Set or Swage.

As Saws are left stiffer for spring set than for swaging, always be careful to mention whether they are to be run with full swage, or entirely spring set.

The Arbor.

Nearly all arbors run more or less warm, and it is essential that the exact warmth be given as near as possible, so that allowance for this can be made in adjusting the Saw. This is particularly the case with regard to low speed Saws—that is, Saws that do not run at a rim speed of more than 50 to 60 per cent of the standard. That is to say, a Saw that runs 400 revolutions per minute is affected by a certain amount of heat—twice as much as it would be if the speed were 800, instead of 400, revolutions per minute. Hence the importance in low speed mills of having the arbor run cool; but, in case it does heat a little, the exact amount of heat, as near as possible, should be given. No arbor should be allowed to heat to any great extent, particularly those in low speed mills. Remember that the manufacturer of Saws should know all the conditions in order to make a Saw that will run successfully.

Shingle and Heading Saws.

When ordering Shingle Saws, give the following dimensions plainly:

Diameter in inches.

Thickness of gauge at centre.

Thickness of gauge at rim.

Full sketch or pattern of holes, and sample of screw by which to drill and countersink.

If you have a flange, send it to have the holes in Saw made to fit it.

If you wish us to furnish the flange, send full and correct sketch of diameter, thickness, holes, etc.

State whose make of machine the Saw is to go on, and be sure to give flat or countersunk side, and the direction in which the teeth run. (See engraving below.)

Left-Hand Saw.

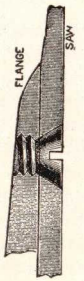
Right-Hand Saw

Particular attention is called to the importance of using screws that are suitable for the thickness of the Saw. We frequently receive screws as samples by which to drill and countersink, that have heads entirely too large, and which require the flange, to be countersunk (as shown on page 14 Fig. 1) thereby reducing the length of the thread, and making it impossible to bind the Saw firmly.

Fig. 2 shows the correct size screw heads should be, thus getting a good bearing for the screw heads on the countersink in Saw, and leaving the full thickness of the flange for the thread. In no case should the screw heads be deeper than the thickness of Saw.

Fig. 1

Fig. 2.



Concave Saws.

Attention is respectfully called to our Concave Saws, of which we manufacture large numbers. They are dished, tempered and ground by our new and patented process, and are of superior quality in every respect.

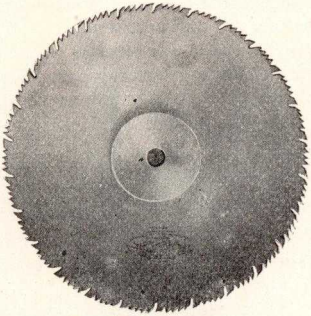
To keep Concave Saws in order, set the teeth alike on both sides of the plate. To do this, use a small piece of steel plate filed on one edge convex to fit the concave side of the Saw—the other edge concave to fit the convex side of the Saw.

Left-Hand Saw.

Right-Hand Saw.

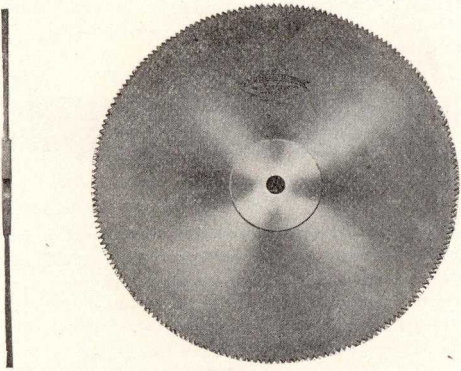
As they cut with the grain as well as across the grain, they require less bevel on the teeth than a regular cut-off Saws. They should be, therefore, filed about straight across in front, and beveled on the backs

of the teeth. Keep the same amount of hook on the fronts of all the teeth; keep the gullets round by the use of a round edge emery wheel, or round file, and do not run the Saw when extremely dull.



Novelty Mitre Saws

The above cut represents a Circular Mitre Cut-off Saw. These Saws are ground to run without set. They are especially adapted for smooth cutting, but will not cut as fast as an ordinary Saw fitted with either set or swage. They should be kept perfectly round and true on the edge, and filed flemming back and front of teeth.



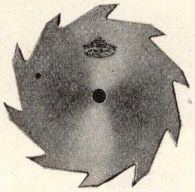
Mitre Novelty Saw.

This Saw can be made for either rip or cut-off work. When used for ripping, the teeth should be so that when a straight edge is laid

across the centre of Saw, it will also be in line with the front of teeth For cross-cutting exclusively, a "V" tooth is better.

These Saws have a certain number of raker teeth which should always be a trifle lower than the cutting teeth.

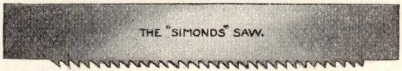
A Novelty Saw, when fitted with "pitch to centre" or regular "V" tooth, can be used for either splitting or cross-cut work; but, for doing either work exclusively, it is better to have the tooth that is adapted to the work.



Grooving Saws.

These Saws are ground thinner at the centre than at the rim, so that little or no set is required, or just enough to keep the extreme points at teeth perceptibly wider than the body of tooth. We make them any gauge at edge or centre, as requested.

In ordering Groover Saws, state whether wanted straight or hollow ground; if the latter, give size or collar.

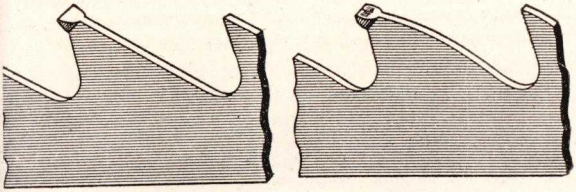


Gang Saws.

Our Gangs are made from steel which is especially adapted to their use, and they are evenly tempered and ground, and perfectly adjusted.

There are two ways to fit Gangs—spring set and swage, the latter being the more preferable.

In swaging Gangs, as in swaging circulars, or any kind of Saws, great care should be taken to keep the teeth in proper shape. (See sketches A and B.)



Sketch "A" Sketch "B."

Sketch "A" represents a section of a Gang in proper shape to swage and do good work.

Sketch "B" represents the condition in which they are frequently sent us for repairs. It can be seen that in cut "B" the tooth is very stunt near the point, and it is impossible for any swage to spread the point of a tooth when in this condition, for it results in splits and checks at the points of the teeth, and eventually in dropping of corners. We, therefore, recommend that the teeth be kept in proper shape, as in cut "A," and we guarantee that there will be no trouble from checking or dropping of corners. Also keep the gullets round, and do not run the Saws when extremely dull.

Gang Edger Saws.

In ordering Saws for Gang Edgers, always send an impression of the eye and pin holes.

These Saws, if used for making scantlings, should be heavy, say, 7 or 8 gauge. and in no case less than 9. If used for sawing boards exclusively, as thin as 10 gauge can be used.

There are two ways to fit these Saws—spring set, and full swage. In either style of fitting it is necessary to have plenty of hook and a good round gullet. They are far less liable to crack at bottom of gullet than when these requirements are lacking.

When fitting full swage, care should be taken to keep the teeth in proper shape to swage, for, if they are not, they cannot be successfully swaged. (See instructions on page 45 on Swages and Swaging.)

In fitted spring set, the teeth should be sufficiently stout so they will not chatter and vibrate, as a stout tooth holds the set much better than a slim one. Do not set the tooth too far into the body, as it does not stand up so well in a tough place. The extreme points of the teeth should always be fully as wide as the thickness of the plate.

Inserted Point Saws.

Before inserting new Points, the grooves in the plate and shanks should be wiped perfectly clean, and well oiled so that the Points will draw easily into the plate. When inserting a Point, pick it up with the left hand, and, after dipping the grooved part in oil, place it in position, holding it even with the sides of shank. Great care should be taken in refilling a Saw with a new set of Points, to have the Point seat clean and free from particles of fine dust or gum which may have collected there in the use of the Saw, as this is often the cause of the Saws, being out of round.

Fitting Inserted Point Saws.

After inserting a set of Points, the shanks should be carefully examined, and, if any are found projecting on either side of the plate, a light blow of a hammer on the projecting part will be sufficient to knock it into the proper position. They should be exactly on the centre. This is a matter of special importance when a narrow kerf is desired, for, if the shank be allowed to project a little on one side, when the kerf is narrow it would be likely to rub against the side of the cut and cause trouble.

Side-Dressing Inserted Point Saws.

It is almost impossible to make Points that are adapted to all kinds of work, but, with a little side-dressing, our Points can be adapted to any kind of work required of an Inserted Tooth Saw.

In sawing hard wood, the points of the teeth should be a trifle narrower than for soft or fibrous timber; also, the extreme point should be quite a little wider than body of the tooth. In sawing frozen timber,

great care must be taken to have the extreme point the widest, and the corners should be sharp so the Saw will not dodge out in the first cut Special attention is called to fitting Inserted Points for sapling pine. It is well known that there is a great deal of trouble in sawing this kind of timber. The inner bark sometimes comes off in long strings, as it were, instead of sawdust, and is drawn in between the Saw and the log, causing the Saw to run hard, and make bad lumber. This can be avoided by side-dressing the points, as shown in cut "C" below—instead of as shown in cut "B." The advantage in this style of side-dressing is that the corners, being sharp where they come in contact with the side of the cut, the stringy or fibrous bark is cut into small particles, instead of being pulled out in long strings as referred to above.

Cut C.

Cut B.

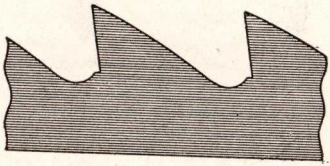
Cuts B, D and F represent our different styles of gullet. Style "D," being the largest, is better adapted to very large timber, on account of having large throat or sawdust chambers. Style "B" also has large chambers, but not so large as "D," and is better for smaller logs where a faster feed is used. Style "F" is suitable for almost any kind of sawing, but having a small gullet and larger number of teeth than either of the others, is better for sawing light timber with fast feed.

Fitting Small Circular Rip Saws.

These Saws should be kept perfectly round and true on the edge, and the gullets round at the bottom, and of equal depth and width.

They should never be filed to sharp corners at the bottom of the teeth for this might cause them to crack at this point. The best results can only be obtained by keeping the points of the teeth sharp and in proper shape to cut. They should be either set or swaged for clearance, and this work should be carefully done. If swaged, the corners should be of uniform width and depth, and sufficiently stout so they will not crumble off in the cut.

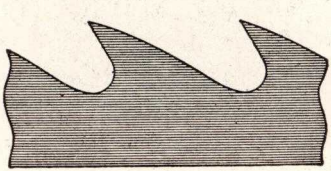
Saws are frequently complained of as being either too hard or too soft, when in reality the trouble is entirely due to the manner in which they are filed. For instance, if the teeth are lacking in hook, and are extremely stout at the points, as shown in cut "A," they will cut hard even when sharp.



Cut "A".

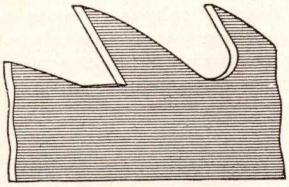
When they become slightly dull, which they will in a very short time, on account of the blunt shape of the points, they will not cut at all, and are very liable to crack when in this condition. We recommend, therefore, that the teeth be kept in proper shape, as shown in cut "B," and the results obtained, both in quality and quantity of work done, will pay well, for the time and labor expended in keeping them in proper condition.

An emery wheel or round file is indispensable to the proper care of these Saws, for it is impossible to maintain the desired shape with the use of a common flat file only.



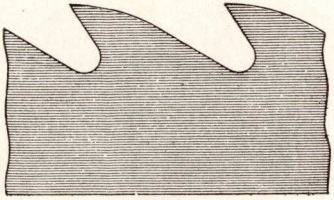
Cut "B".

In order to maintain the original pitch and back line of the tooth, it is necessary that about the same amount of filing be done on the back, as on the front, of the tooth. For, if there is more filing done on the face of the tooth than on the back, the original shape is soon destroyed and it is almost impossible to restore it to the proper shape without retoothing the Saw.



Cut "C."

Cut "C" will perhaps illustrate the idea better than anything that might be said on the subject. Cut "C" represents a tooth of a Saw where all the filing is done on the face. The bad results from this method of filing can be readily seen. The body of the tooth is now so slim that it will not support the point in doing its work, but will chatter and vibrate in the cut, and be liable to eventually break at this weak point.



Cut "D."

Cut "B," previously referred to, represents a tooth very well adapted to miscellaneous work, but if very hard or kiln dried hardwood is to be sawed, we would recommend a narrower gullet and stouter tooth, as

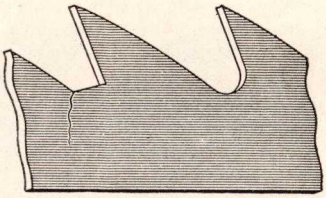
shown in cut "D." Also for this class of work, the set or swage for clearance should be the least amount that will clear the plate and prevent friction and heating. The smoothness of the work done, and the light and easy running of the Saw, depends largely on the teeth being properly set for the special work required of the Saw.

Gang Lath Saws.

These Saws should always be swaged instead of set. They require a good deal more clearance than Saws for ordinary work. Where, for any reason, it is necessary to use Lath Saws fitted with spring set, it is better to have them at least one gauge thicker than if run full swage. They should always have a larger number of teeth, and the teeth should be stouter. A stout tooth holds the set far better than a slim tooth. Lath Saws often heat and burn if run spring set, for the reason that the teeth are not sufficiently stout to prevent them from closing up or losing the set while working in a tough place in the cut.

Small Saws Cracking at the Rim.

Among the various causes for this class of trouble is filing too sharp corners at the bottom of the teeth. Cut "E" represents a section of a 14″ Saw filed in this manner, which cracked and was sent to us for repairs.



Cut "E."

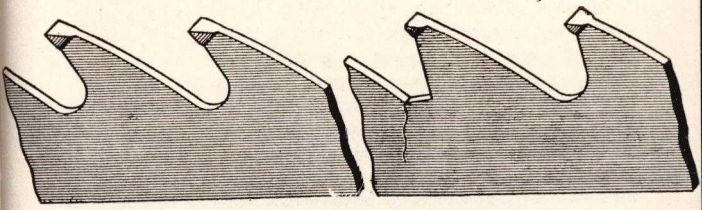
It can be seen that the fracture started at the sharp notch made by the corner of the file. Experience teaches us that the crack invariably starts at the sharp notch, for the reason that the entire strain is centred

at this point, instead of being distributed throughout a larger circle. The sharp notch, also, prevents the free circulation of the sawdust.

Speed of Small Circular Saws.

It is a remarkable fact that in the use of small Circular Saws very little attention is given to the speed at which they are run. Yet this is one of the most important matters to be considered in connection wifh their use. A 12″ Saw should have a speed of at least 3500 revolutions per minute. Where fast work is required, better results can be obtained by having a speed of 4000 revolutions. Our Saws are adjusted to run at a standard speed of about that stated above.

Experience teaches us that if Saws are run at the speed for which they are adjusted, they will cut faster and smoother, and the general results obtained will be far more satisfactory than if run at a lower rate of speed. Hence, we recommend that the Saws be run at the standard speed, and that the arbor be not permitted to heat the Saw at the centre. If these precautions are taken, there will be far better results obtained, and fewer cracked Saws.



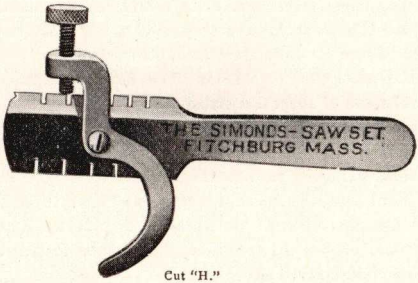
Cut "F" Cut "G."

Of the above cuts, cut "F" represents the proper, and cut "G" the improper, manner of fitting Saws full swage.

The teeth of Saws are frequently split at the points by attempting to swage them when in the condition shown in cut "G." The teeth should always be kept in about the shape shown in cut "F," and much trouble will be avoided in swaging, and fewer split teeth or cracked Saws.

No matter whether Rip Saws be fitted with swage or spring set, they should be filed straight across in front and back of the teeth.

It is a mistake to think that Rip Saws will do better work if beveled than if dressed square across. A beveled tooth has a tendency to split the fibre instead of cutting it off squarely across. The bevel also produces a lateral motion which causes the teeth to chatter and vibrate in the cut. Many Saws are cracked from this cause.



Cut "H."

We would call attention to cut "H" which represents a finely constructed tool for setting the points of teeth in small Rip and Cut-off Saws. We consider it the best thing of its kind on the market. This is a combination tool, having a gauge attachment for the purpose of regulating the set. It can be seen that this set is provided with setting slots which are so graduated as to give the desired depth to the set in each gauge of teeth they are intended to set.

If, when placing the set on the tooth, it is permitted to drop until the point of the tooth touches the bottom of the slot, and the tooth is bent over until the gauge touches the side of the plate, the set will be perfectly accurate.

Fitting Large Circular Saws.

The points of teeth in large Circular Saws, as well as in small or medium Saws, are the only portion of the Saw which should come in contact with the timber. They must be kept sharp by the use of a file or emery wheel, and set by springing, or spread by swaging. They should be swaged and side-dressed so the extreme point of tooth will be widest, and diminish back

from the point. (See instructions on swaging, page 45). A Saw fitted full swage will stand up better in fast feed than if fitted spring set, but as there is more friction on the edge on account of the points of teeth being wider, it takes more power to drive the Saw. However, for log sawing this style is most reliable.

As the swage wears faster on the log side, and thus makes an unequal strain on the Saw, it is a mistake to try to run a Saw without swaging nearly every time it is filed. Where the timber is clean and free from grit, a Saw may sometimes be run two or three times after being swaged before needing to be swaged again, and, if carefully filed, will do very good work.

Saws Out Of Round.

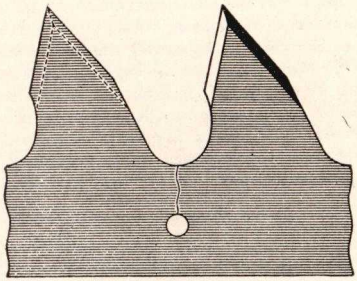
To remedy this defect, hold a piece of emery wheel squarely across the points of the teeth while the Saw is in motion, thus reducing the most prominent teeth. When a Saw has long and short teeth, it follows that the long teeth will have the most work to do, thus producing an unequal strain on the Saw, which will have a tendency to cause the Saw to deviate from its line, heat, and give bad results generally.

The cutting of a Saw should be continuous, and to be so it should be perfectly round; otherwise the best results cannot be obtained. On the same principle, the tooth edge of a Gang, Band, Mill or Mulay, Saw should be perfectly straight.

Fitting of Cut-Off Saws.

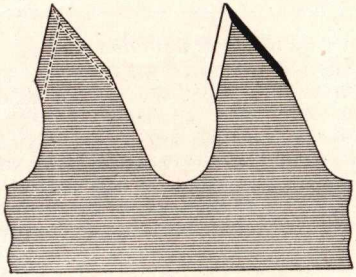
The fitting of Cut-off Saws differs from the fitting of Rip Saws only in the shape of the teeth, and the manner of filing them. Large Cut-off Saws for cutting off large logs where power feed is used, and rapid work is required, should have the pitch line from 4 in 8 front of the centre of the Saw for soft wood; for hard wood a trifle more hook is preferable.

In heavy sawing where a very smooth cut is required, as in cutting off logs for pulp, there is more bevel required than for ordinary work, and the bevel should be about equally divided between the back and front of the tooth. It is a mistake to try to run a large Cut-off Saw for heavy work, where a large amount of bevel is required, with all the bevel on the front of the tooth. A very great bevel on the face of the tooth creates a severe lateral strain. The teeth are thus spread apart, as it were, and forced out of line into the sides of the cut. Where the teeth are extremely stout and short, as shown in cut 1, the strain is transmitted to the bottom of the gullets, and, in many cases, cracks at the rim are the result.



Cut No. 1

In a case of this kind, the teeth should be gummed out, as in cut 2, and the trouble will disappear. Where cracks appear in the plate, as above referred to, not only should the teeth be gummed out in good shape,but there should be a hole drilled at the bottom of the crack to prevent it from extending farther into the plate. See cut 1.



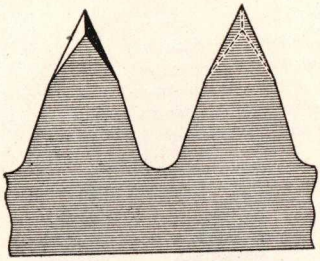
Cut No. 2

For ordinary work the bevel should never extend to the bottom of the tooth. In fact, the point of the tooth *only* needs beveling. the remainder of the tooth and throat should be dressed straight across, as shown in cut 2.

But there are cases, it is claimed, where a longer and wider bevel is required. For instance, where Saws are used for cutting up cedar logs into shingle bolts. Cedar bark is tough and easily separated into strings instead of sawdust. These strings, it is said, often get pulled in between the teeth, and are carried around on the front of the tooth, often collecting in such large quantities in the gullets as to cause much trouble with the working of the saw; whereas, if the face of the tooth had a longer bevel, the sharp edge of the beveled face would, it is claimed by those who advocate this style of filing in such cases, cut the stringy fibre into small particles, and permit it to be properly discharged.

For heavy work, where a smooth cut is not necessary, a Cut-off Saw should be filed nearly straight across on the front of the tooth. Nearly all the bevel should be on the back.

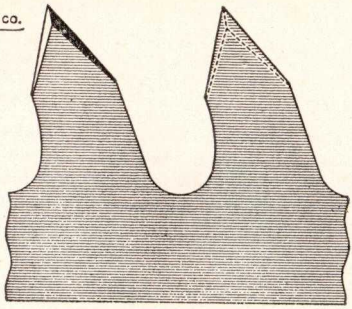
If the back of the point be nicely beveled, as shown in cut No. 3, it will be sufficiently sharp to cut off the fibre, and the square front will carry out the sawdust. This style of filing is preferable, for the reason that it prevents much of the lateral strain previously referred to, and the Saw will run lighter, cut faster, and is less liable to crack than if run on fast feed with an extreme amount of bevel on the face of the tooth.



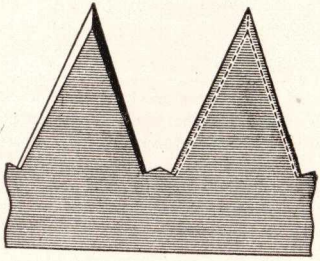
Cut No. 4

This is particularly the case where hard wood is sawed. Hard woods require less bevel than soft wood.

Cut No. 4 represents the proper, and No. 5 the improper, manner of filing a "V" tooth Cut-off Saw.

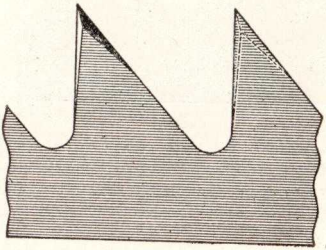


Cut No. 3

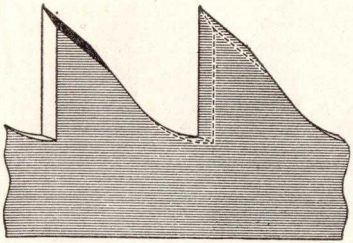


Cut No. 5

Cut No. 6 and No. 7 represent a pitch to the centre tooth, one properly and the other improperly, filed. The style of tooth, and the manner of filing, as shown in Cut No. 6, is used in comparatively light but rapid work in soft fibrous timber where fairly smooth work is desired.

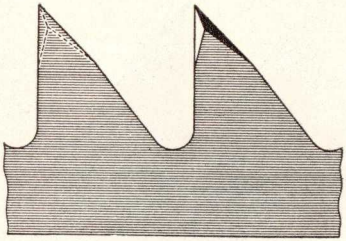


Cut No. 6



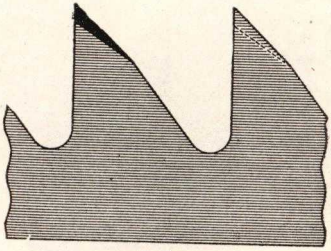
Cut No. 7

Where a smooth cut is desired, we would recommend the style of filling as shown in cut No. 8.



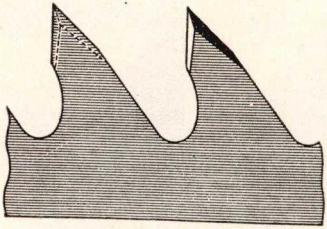
Cut No. 8

Cut No. 9 represents the same style (pitch to the centre) fitted for hard wood.



Cut No. 9

Cut-off Saws with the front of the tooth undercut, as shown in cuts No. 1 and No. 2 on page 26 and No. 10 below, are the best for general use.

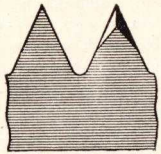


Cut No 10

Cut No. 1 and No. 2 for heavy cutting with fast power feed, and the style shown in cut No. 10 for cordwood Saws, or any kind of work where hand feed is used. If the teeth are kept in this shape. The Saws will give better satisfaction and be far less liable to crack at the rim.

Fitting Small Circular Cut-off Saws.

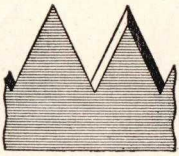
In fitting small Circular Cut-off Saws, as in the fitting of small Rip Saws, it is essential in all cases that they be kept perfectly round and true on the edge. The teeth should be of uniform width and shape, and the gullets of equal depth and width. Every tooth should have the proper amount of bevel, and this bevel should be alike on both sides of the tooth when a "V" tooth is used. See cut No. 11.



Cut No. 11

It can be seen that in cut No. 11 the point of tooth *only* is beveled. The point of the tooth being the only portion of the tooth that cuts, the remainder is left square across to carry out the sawdust.

Cut No. 12 is a representation of cut No. 11 improperly filed to a sharp corner at the bottom of the tooth.



Cut No. 12

If the same amount of time and labor were used in dressing out the gullets with an emery wheel, or filing them down with a round file, that is used in filing the long bevel and sharp notch at the bottom of the tooth, as shown in cut No. 12, much trouble would be avoided from the cracking and breakage of Saws.

In all Saws where the teeth are sufficiently far apart to admit it, the gullets should be kept round.

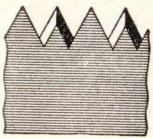
The Set.

The amount of set in these Saws should be the least that will clear the plate sufficiently to prevent friction. The setting of the teeth is an important matter, and this work should be carefully done. The set should never extend too far into the body of the tooth; neither should they be set too close to the point. Where it is attempted to set the teeth too far into the body, the plate is often cramped, and Saws are often cracked in this way. On the other hand, they should never be set too near the points, for if the teeth are bent over too near the points, they will be "needle-pointed" when beveled. They will cut rough when in this condition, and the points will be liable to bend back or crumble off in the cut.

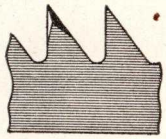
Fine Tooth Cut-off Saws.

These Saws, if used where smooth work is desired, require no pitch or hook to the teeth. See Cut No. 11.

But where more rapid work is desired, a pitch to the centre tooth, as shown in cut No. 14, will cut more rapidly, but the work will not be quite so smoothly done.



Cut No. 13



Cut No. 14

Cut No. 13 shows the proper shape of the teeth, and the manner of filing Cut-off and Mitre Saws. This class of filing is done with a taper file, and the teeth are beveled alike on both sides.

Lining and Fitting Large Circular Saws.

The amount of lead for Circular Saws should be the least amount that will keep the Saw in the cut, and prevent it from heating at the centre. If the lead into the log is too much, the Saw will heat on the rim. If the lead out of the log is too much, the Saw will heat at the centre. We give, therefore, the least amount that is used, which is one-eighth of an inch in 20 feet. Soft, tough, fibrous timber usually requires more lead than hard, close grain, or frozen timber.

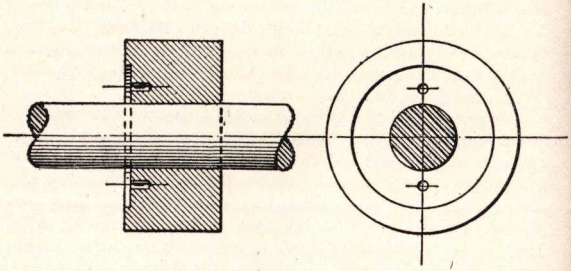
From the various methods used for lining the Saw with the carriage, we give what we think the most easily understood. First, see that the mandrel is set perfectly level, so that the Saw hangs plumb, and is perfectly flat on the log side. Stretch a fine line or thread, say, 20 feet long, across the face of the Saw in a parallel line with the "V" or guide track. This can be easily done by running the carriage back and forth the length of the thread, and placing each end of the thread an equal distance from the front head block. The thread being properly placed, with a piece of chalk, mark the Saw at the front at a point on a level with carriage, and measure the distance between the thread and Saw at this point. This being done, turn the Saw half around, or until the marked point comes opposite the thread again, and once more take the measure between the thread and the marked point on the Saw; then slue the arbor around either way, as the case may require, to give the Saw one-thirty-second of an inch lead into the log in the diameter of a 60-inch Saw

We recommend marking the Saw and taking both measurements from this (marked) point on the Saw, as the Saw might be a trifle out of true A measurement taken from the front and back of the Saw, without turning the Saw over, might not be perfectly accurate.

Hanging The Saw.

Hang the Saw on the mandrel, and, after placing on the loose Collar screw up the nut with the fingers just enough to steady the Saw. Now, try the face of the Saw with the Straight

Edge to see that it is straight; then tighten up the Collars with a wrench, and, if they are right, another trial with the straight edge will show that the position of the Saw has not been changed. If the rim has been thrown over either way, the Collars are not right, and should be turned in proper shape. (See sketch below.



Sketch of Collar.

The Saw should slip freely on the mandrel, and close up to the fast collar. In many cases where the stem of the arbor is a trifle large near the collar, the Saw, in being forced to its place by the nut, is made full on the log side. Frequently it will be found that the metal around where the steady pins are driven, will be raised to form a bunch around the pins; if so, file or cut it off with a cold chisel.

A six inch collar should have a perfectly flat bearing of at least three-fourths of an inch on the outer rim, the rest being chambered out, as they hold tighter than a flat collar. Where collars are larger than six inches in diameter, this rim should be proportionately larger. The pin holes should be in the fast collar —the pins in the loose collar. In putting the pins into the loose collar, the holes should be drilled clear through the collar, so that in case the pins are broken off, they can be driven out with a punch, and thus avoid having to drill them out. We note most up-to-date mill builders are now putting them in this way. On all Saws 48 in. and larger we recommend 8 in. collars with 7/8 in. pin holes on a 5 in. circle..

Gumming Saws With An Emery Wheel.

When gumming with an emery wheel, the operation should be performed by going around the Saw several times. Doing too much work at one time will heat the Saw at the gullet and

stretches the rim so that after a few operations the Saw would need hammering to restore it to the original tension. There is no excuse for crowding the emery wheel so as to heat the Saw to a blue, as this is sure to injure the Saw where the emery wheel comes in contact with it, often glazing it so hard that a file will make no impression whatever upon it. From these hard spots on the outer surface, small cracks begin, invisable at first to the eye, but gradually enlarging until they become dangerous fractures.

Hacking the wheel with a file or cold chisel will make it cut faster, and prevent it from glazing, so that it is not so liable to heat the Saw.

A good emery wheel dresser can be made from an iron bolt, and some ½ in. or ⅝ in. washers This is far better than the hacking plan, as it not only serves to rough up the wheel and remove the gum from it, but it also can be used for the purpose of rounding off the sharp edge of the wheel, which is made so by grinding more on the backs of the teeth than at the bottom of the gullets. The edge of the emery wheel should always be round when used in gumming out the throats of the teeth. and should always be of sufficient thickness to give a good, large, round gullet.

Sawing Frozen Timber.

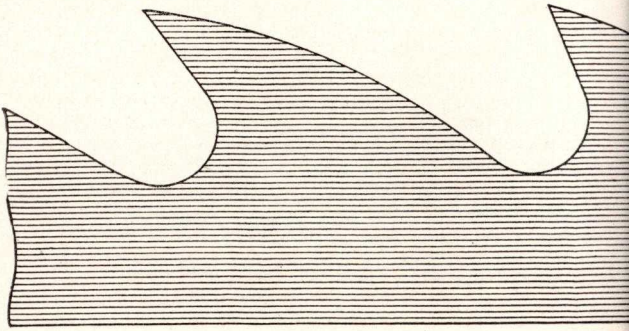
Frosted steel is always brittle, and a Saw should never be used until the frost has been taken out of the plate This can be done by prying over the end of the carriage with a piece of board, holding the end firmly again the Saw, and moving it along the Saw. The friction will, in a few minutes, warm the Saw, and take out the frost. This will guard against the Saw's cracking or breaking from the frost being in the plate. In frozen timber, run your Saw as close as possible; that is, run as narrow a set or swage as will clear the plate and prevent heating As frozen timber cuts much cleaner, less set is required. Do not have the set or swage extend as far into the body of tooth as in Summer sawing; the point being narrower, requires less depth to support the corner. Keep good sharp corners; file the teeth perfectly square across, and line the Saw nearly straight with the carriage, and frozen timber can be sawed as easily as any kind.

In sawing frozen timber, some sawyers give their Saw a little more lead, thinking it will aid in slabbing a log. This is a mistake, for the reason that if a Saw is lined into the log, after the first or second cut, or after the frozen sap is taken off, the Saw will have a tendency to run into the log, and make the lumber thin at the rear end of the cut. To prevent this, the Saw must be guided out a little with the guide pins. The Saws will then run out in the first cut worse than before. It will be a trifle full between the rim and the centre, and will heat at this point, causing the Saw to tremble and flutter, and work badly.

Our advice in lining a Saw for frozen timber, is to line it in such a way that it will run on the board guide instead of log guide; that is, after the Saw has attained its normal speed, set the board guide so it will touch the Saw lightly. Bring the log guide close to the Saw, but not close enough to pinch the Saw in the guides. Any play given the Saw should be on the log guide. If a Saw does not run so it can be guided in this manner, look to the lining, and line it so you can run it on a straight guide.

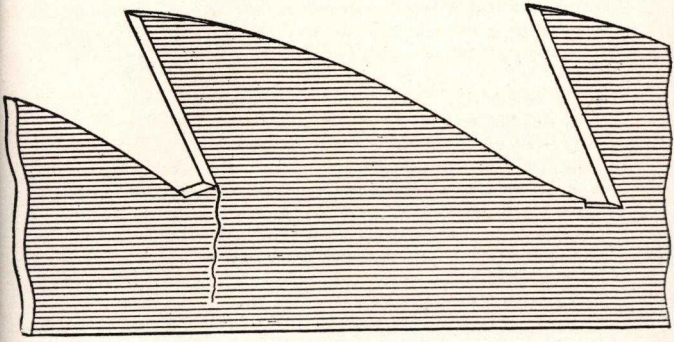
Saws Cracking In Frozen Timber.

Sketch "A" on this page represents the style of tooth we send out for Winter sawing, and we guarantee that if Saws of our make are kept in this condition, there will be no trouble from cracking or breaking.



Sketch A.

Sketch "B" represents the condition in which Saws are sometimes returned to us with the complaint that the Saw is defective, whereas the direct cause is the shape of tooth.

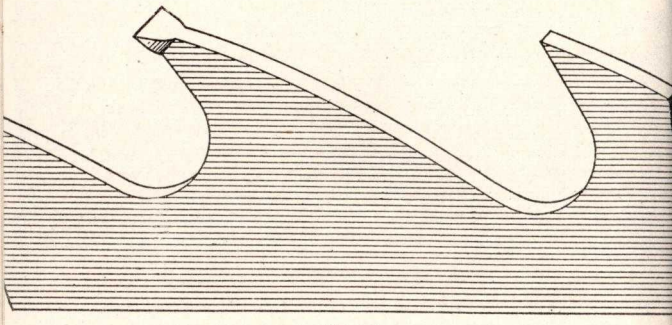


Sketch B.

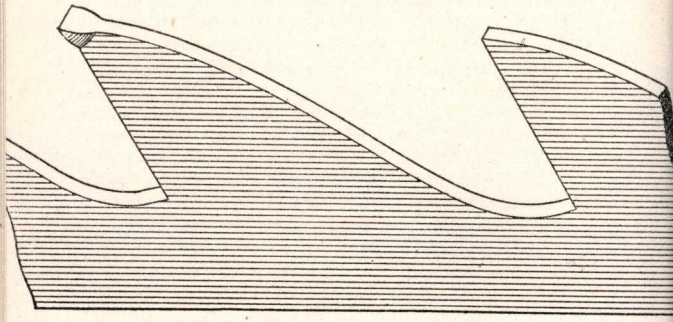
Sketch "A" represents a section of a 52 in. Saw with 52 teeth. We use this diameter and number of teeth, being the average size and number of teeth generally used in this class of work. It can be seen that this is a good stout tooth, with ample chamber or gullet to carry out the sawdust, and has a depth of 1¼ in. from point of tooth to extreme bottom of gullet. This tooth is sufficiently deep for Winter, and is better than if it were deeper, for, after gumming the tooth to sufficient depth for the work required of the Saw, any additional depth only serves to cause the tooth to chatter and vibrate in the cut. And further, in going deeper into the plate, the gullet becomes more wedge-shaped, which causes the dust to choke and wedge in the gullets, creating a severe strain at this point, which eventually results in cracks or broken teeth.

In addition to preserving this style of tooth, it is also necessary that they be fitted in proper manner, and we recommend the style of fitting as shown in sketch "C" instead of sketch "D." We recommend this style of fitting for frozen timber, as a Saw with sharp corners is less liable to dodge or run out in tak-

ing off a light slab Saws fitted as shown in cut "D" often give a great deal of trouble. The corners being dull and rounding, do not take hold and enter the log as they should, but dodge out and lay over from the log, causing the Saw to heat between the rim and centre. The result is that it is liable to run into the log as much the second cut as it run out in the first, thereby making wedge-shaped lumber.



Sketch C.



Sketch D.

Dull Teeth And Square Gullets.

We have had Saws returned to us as shown at "B," not because they were defective when they left our Factory, but because they had not been properly kept in order.

Do not file square corners at gullets of the Saw, as it is very liable to break, as shown in cut above at "B," particularly when dull, or in frozen timber. Our warranty does not cover Saws broken from sharp corners filed at the gullets.

Large Circular Saws. Cracking At Gullets.

During the many years we have been engaged in the manufacture of Saws, we have kept constantly in touch with those engaged in the use and care of them. In this way we have become thoroughly acquainted with many of their troubles, and have made a study of how to overcome them. The great loss to the millmen and Saw manufacturer from the breaking of Circular Saws, has induced us to make a special study of the causes of cracking and breaking of Saws.

Our investigation of this matter has lead us to give special attention to the hook, size and depth of gullets, in Rip Saws, as we felt from the start that this had more to do with the cracking of Saws and breaking out of teeth than anything else in connection with their use and manufacture.

Having been constantly improving the shape of teeth to meet the demands of the constantly increasing amount of work required of Saws, we feel we are in position to be able to give valuable advice on this subject.

In our experience we find the amount of hook, depth, size and shape of gullets, all play an important part in the working and success of a Saw, and all combine to bring about the success or failure of it. If a Saw is lacking in the proper amount of hook, or nearly straight on the face, the teeth will scrape instead of cut, and will soon become dull. This makes no end of trouble in itself, for the teeth will cut hard, and it will take double the amount of power to force the Saw through a log. The severe strain on the teeth in this dull condition causes them to tremble in the cut, producing a tremulous strain on the plate

that calls for more tension. Again, the severe strain on the teeth and at the bottom of gullets, tends to crack the plate at this point and breaks out the teeth. When you add to this a deep, narrow, wedge-shaped gullet, as shown on pages 42 to 45, you add still more to the already severe strain on the rim.

The straight teeth cut hard and dull quickly. The deep, narrow, wedge-shaped gullets do not discharge the dust freely, but instead allow it to be forced into the bottom of the gullets, something like driving a wedge. It can readily be seen that a combination of this kind works together to bring about the same bad results—namely, a tremulous and severe tensile strain on the edge, which no Saw can be expected to stand. Although the Saw may have tension enough under ordinary conditions, the conditions referred to above so strain and stretch the edge while the Saw is at work, that more tension is required to guard against the Saw's running snaky.

Considering the elasticity of the steel, it is reasonable to concede that anything that tends to pull or strain the plate, will stretch it, and the more it stretches, the more ension is required to make it stand up to its work. It has been fully demonstrated, both in Bands as well as in Circulars, that an extreme amount of tension tends to throw too heavy a strain on the edge of the plate, and, sooner or later, it will cause the Saw to crack at the gullets. The same choking and wedging of sawdust at the gullets tends to cause the teeth to break out.

A great many filers, when their Saw gets in the condition above mentioned, instead of adding a little more hook, and making a good, large, round gullet, as shown in sketch "A," give the Saw more tension to overcome their trouble. This is detrimental to the Saw, as the increased amount of tension adds correspondingly to the tensile strain. In other words, to increase the tension of a Saw to overcome something that might be overcome otherwise, is a great mistake, and one that will surely lead to trouble.

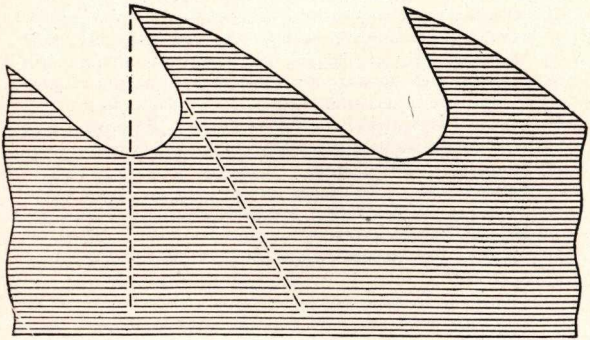
We find in our experience that the hook of a Saw, to be normal, must be tangent to a circle whose diameter is one-half that of the Saw. It is a matter of common observation that this standard is often departed from, and, as a rule, there are more cases where the hook is taken out than where more is added.

This is just the opposite to what it should be, for the reason that the pitch referred to above is the limit, or the least amount of hook that a Saw should have to run successfully and stand big feed with any certainty of not cracking. Although this pitch is considered the standard, a Saw will do equally as good work, nine cases in ten, with a little more than this. In fact, our Saws when leaving the Factory, have quite a little more than this amount, and we have yet to learn of a case where there was any trouble from this quarter.

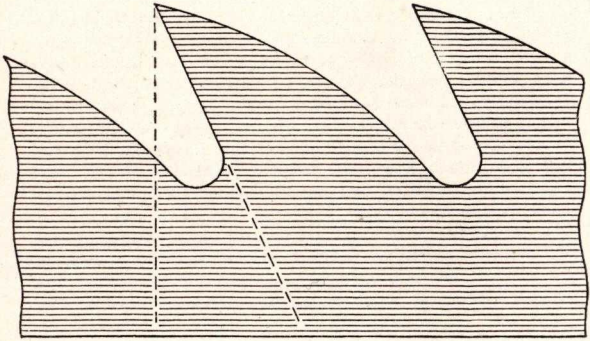
Since we have adopted our present tooth for large Circulars, as shown in sketch "A," we have never had a Saw returned to us cracked, except where there had been a radical departure from this standard, either in hook of tooth, shape of gullet, or both.

Cuts B, C, D, E, F, and G, represent sections of six 60 in. Saws with 90 teeth, that were returned to us at different times to be retoothed, having been cracked in the work. The direct cause of their cracking was the shape of the teeth, which, after being retoothed on the lines of cut "A," gave no further trouble.

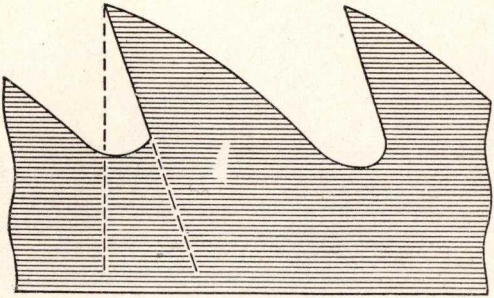
There is another class of filers who may also be benefited in this way. They are men who may have been filing for years, always having had fairly good success, but for some reason have never given the question of shape of teeth any study. When they find their Saws have begun to crack, and their attention is called to the shape of the teeth, they make this reply: "I am running the same style of tooth that I have run for years, and never had a Saw crack till now." The fact is they were right on the point of cracking all the time, but they did not know it. It is a case of the "last straw." The Saw may have had to contend with some condition a little harder than heretofore. For instance, a lack of sufficient amount of steam to keep up the speed of the Saw while the feed remained the same, a little tougher timber than usual, an increased amount of feed as compared with former years. While the general appearance of the teeth may be the same, there may have been a slight departure from this standard, just enough to cause the Saw to crack under the strain.



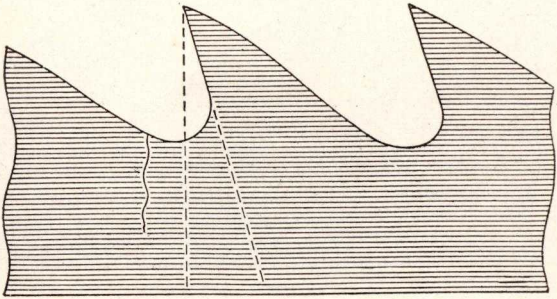
Sketch A.



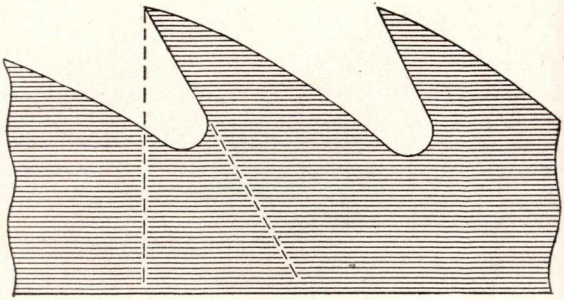
Sketch B.



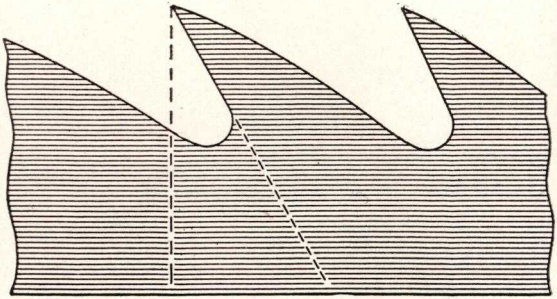
Sketch C.



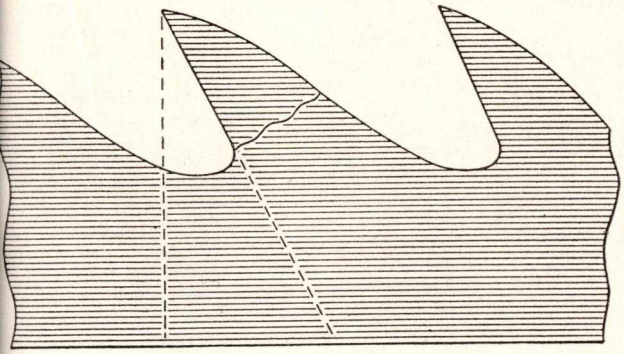
Sketch D.



Sketch E.



Sketch F.



Sketch G.

Swaging.

In the use of all Swages employed in spreading the points of Saw teeth, great care should be taken to see that the swaging dies are in the best condition possible, for, if they are not, they will not do the work required of them in anything like a satisfactory manner.

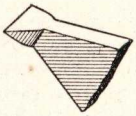
The teeth should also be kept in proper shape for swaging. In many instances not enough care is given to the shape of the teeth. It is a matter of great importance that the teeth be kept in proper shape to swage, as the swaging, fitting, and shape of teeth, have much to do with the successful use of a Saw. If a Saw has a good, large, round gullet, with plenty of hook in the teeth, nicely swaged and fitted, it will take far less power to drive it, make better and more lumber, and require a great deal less work to keep the plate in shape than when these conditions are not properly met.

The teeth should be slim enough to swage out easily, giving a good swage at front and back of tooth, but not slim enough to turn over or bend back in the cut. Many filers when

they find the points of teeth turn back a little in the cut, knowing that this is caused by their being a little too slim, overdo when adding more strength to the point, when just a little would we sufficient to obviate their trouble.

If the tooth is too slim, as shown in cut "E," the swage will spread too much at the extreme points, and not extend far enough into the body of the tooth to give it the required strength. In this case the corners would be needle pointed, as in cut "F," and would be likely to break off or bend back in the cut, and the Saw will not run half the usual time before it will need refitting. On the other hand, if the teeth are too stout, as in cut "C," the swage will spread too far into the body of the tooth, and not enough at the points. It will be seen that if a tooth is too stout and round on the back near the point, as in cut "C," the top die, instead of bearing a little heaviest at the point, as it should, bears too heavy on the high or round part back from the point, and bears scarcely any at the extreme point. Thus, instead of the point being spread as it should, it is pulled apart, and the result is checks and splits at the point. See cut "D."

Sketch A.

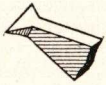


Sketch B.

Sketch C.

Sketch D.

Sketch E.



Sketch F.

Where there is such a large amount of material in the tooth, it requires double the amount of pressure to spreead it. In fact, it does not spread clear through the tooth, but simply rolls the metal over at each side of the tooth, extending quite a distance down the back of the tooth, with scarcely any in front. Another bad feature in connection with swaging a very stunt

tooth, is that it takes such a heavy pressure to spread the tooth, the dies acting on hardened steel having a tendency to crystallize and case-harden the steel, which will eventually cause checking and dropping of corners.

In some cases, notwithstanding the fact that the teeth when new are in proper shape to swage, the first swaging it not, perhaps, as satisfactory as desired, for the reason that in the first operation the swage must shape the tooth to conform to the shape of the swaging dies. After the first swaging, if care is used to not materially alter the shape of tooth thus formed by the swage, there will be no further trouble (as the swage will then fit the tooth, bearing equally on he part of the tooth being swaged. After swaging, the tooth should be dressed off on the back, taking off the hump or shoulder just back of the swage, so that when next swaged the top die will not bear on this shoulder and cause trouble.

We submit a number of cuts of different forms of teeth for convenience in illustrating our ideas on this subject.

Cut "A" represents section of a tooth in proper shape to swage. Cut "B" represents the same tooth after being swaged, and before being fitted. It will be seen that the tooth has been altered but very little in the process of swaging, requiring very little dressing to bring it to its original shape. Cut "C" also shows a tooth before being swaged, and cut "D" the same tooth after the operation. It can readily be seen the great amount of force it must have taken to spread this amount of hardened steel, and also the work required to bring the tooth to a good working shape. A tooth in this shape makes trouble in swaging, and is detrimental to the general working of the Saw, as the teeth will cut much harder, and for this reason the plate is more apt to crack at the gullets from the severe strain on the edge.

Cut "E" represents a tooth before being swaged, and cut "F" the same tooth after swaging. In this case, as in the others, the shape of the swage is governed by the shape of the tooth before the operation. The tooth being too slim, the spreading was done at the extreme point, and the corners are therefore needle pointed and it will not stand in fast feed, or in fact in any kind of sawing.

Relative to large Circular Saws cracking and breaking over the collar line, we claim Saws never break in this manner when running straight, but invariably when "laying over" or crowding out of the log. To have a Saw run perfectly true, it is absolutely necessary that collars and stem of mandrel be true and well fitted, for any imperfections in these may lead to no end of trouble; they should fit exactly.

To guard against Saws breaking over the collar line, great care should be taken to have the Saw hang perfectly true on the mandrel. To ascertain whether the collars are defective, place the Saw on the mandrel, and tighten up the collars by hand. Test the Saw with a straight edge, and, if found correct, tighten up the collar with a wrench, and test again with a straight edge to see if the position of the blade has been altered. If any change is noticed, it is safe to assume that the Saw is true, and that the trouble lies in the collars, and that they require trueing up before satisfactory results can be obtained.

For large Saws we prefer a collar that has a perfect bearing on the outer rim of at least three-quarters of an inch (in a six-inch collar), the other part being chambered out so that it will not come in contact with centre of Saw, as they hold tighter than a solid flat collar. For a collar larger than six inch, this rim should be proportionately greater.

If the collars have become worn at the outer edge, so that when tightened with a wrench the Saw will be full or convex on the log side, it will heat at the centre and become more convex, causing it to lay over from the log. The arbor should be so lined that the Saw will lead into the log just enough to clear the centre in good shape, so that it will not rub against the log and heat at centre. If it heats and becomes expanded at this point, it will dish and run either in or out of the log, (usually out) causing the same kind of trouble referred to above.

Another cause for Saws cracking over the collar in this manner is that the Saw, when adjusted for a certain (high) speed, is usually dishing when not in motion, but, when running at the speed for which it is made, is perfectly straight. If the speed be reduced while in the cut, the Saw will become dished for want of the necessary speed to straighten it out. In a case where it heats at centre, it will run either in or out of the log (generally out), forming a wedge

between the Saw and head blocks, eventually cracking or breaking the Saw at or near the collar line by forcing it over this rigid point. Hence, the importance of maintaining a uniform speed, and having the tension adapted to it.

As we have stated above, large Saws for a high speed mill are, when properly adjusted, dishing when not in motion, and great care should be taken to see that they are straight when running at their normal speed. In other words, they should dish or drop through as much one way as the other. To see that they are right in this respect, lay the Saw on an anvil or board, hold a straight edge across the Saw at right angles with the part that rests on the board, and the opposite edge that is being raised to allow the Saw to drop through at the centre, then take the measurement of the amount it drops through at centre, turn the Saw over, and repeat the operation, noting if it drops or dishes alike on both sides. If it does, it is correct.

In mills where there is trouble from Saws cracking over the collar, the following rule should be carefully observed. Test the Saw to see that it hangs perfectly true and flat on the log side. This can be done by holding a 24 in. to 30 in straight edge lightly on the face or log side of the Saw when in motion. If the Saw is found to be correct in this respect, the centre should be carefully examined to see that it does not heat above a normal degree.

If it is found that the Saw heats quite a little at the centre, the cause should be located and corrected; it is usually caused by a hot arbor. Where this is the case, the arbor should be made to run cool, but where it is impossible to do so, we would recommend that the tension of the Saw be readjusted so as to leave it a little stiffer toward the centre. This will offset the tension produced by the heat of the arbor.

The same adjustment of the tension is advisable where there is not sufficient power to maintain a uniform speed when the Saw is in a heavy cut. If a Saw is left a little stiffer for a distance of about 10 in. to 12 in. from the centre, the tendency will be to prevent it from laying over and crowding out should there be a reduction in the speed.

Hammering Circular Saws.

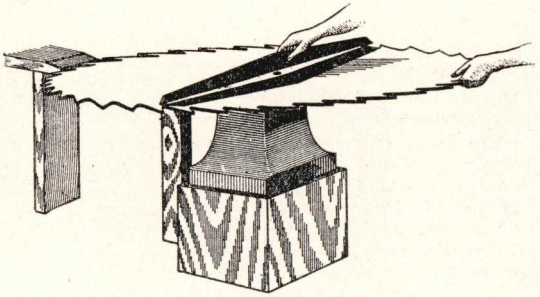
All Saws, if properly made, are, what we call, open toward the centre, this amount being more or less in proportion to the number of revolutions the Saw is to run.

The object is to keep the edge strained on a straight line, to prevent it from rattling in the guides, and cutting a zig-zag kerf through the timber. What applies to one Saw in hammering, applies to all. The Circular Saw, however, is the most difficult to treat, and, even after the most careful instructions are given, it requires practical experience and the most careful observation on the part of those having them in charge to hammer them successfully.

The strain on the rim, caused by the choking and wedging of sawdust, particularly where the teeth are close together, with narrow gullets, such as are used in large mills with fast feed, and the process of gumming, will in time, stretch the rim, and it will begin to run snaky and make bad lumber.

However, before concluding that the Saw needs hammering to adjust the tension, see if there is not some other cause for the trouble, such as the Saw being lined into the log too much, which would cause it to draw into the log and heat on the rim, the guides not being properly adjusted, the gullets being to narrow for the feed, or the teeth not being properly swaged and dressed. These matters, however, are all referred to in our instructions on "Fitting and Running Saws," and are only mentioned here in connection with the instructions on straightening, our object here being to treat only on the hammering necessary to keep the Saw true, and the tension properly adjusted to speed, feed, and class of work required of the Saw.

What is required in the way of tools is an anvil, one straight edge 18 to 20 inches long, one about 36 inches, and one 48 inches long. We find that these tools are being put in for adjusting large Saws in many of the large mills. The men that handle the Saws are becoming thoroughly acquainted with the art of Saw straightening, and this knowledge they have acquired by perseverance and a careful application to the rules governing this class of work, and by practical experience.

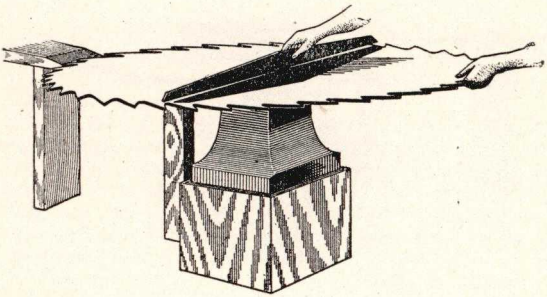


Cut No. 1

In studying the art of hammering Circular Saws, it would be well for those having charge of them, to examine them carefully when new, closely noting the amount the Saw drops away from the straight edge, as shown in figure "5," also test in the same manner at the centre as shown in figure "6." It is a matter of much importance that these tests be made carefully, and we recommend that measurements be taken therefrom.

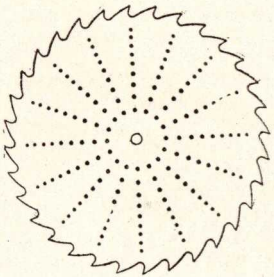
There are tension gauges in use which can be adjusted to any amount the Saw may drop, but, where nothing of this kind is available, a gauge may be made from a thin piece of steel. It should be of sufficient length to reach from centre to rim of Saw, and made convex to fit the dish in Saw, when held as in cut "5." It is necessary to have one for the centre, as well as from centre to rim. It should be the same length as the one used from centre to rim, and made to conform to the amount the Saw drops at centre, when held as in figure "6."

We do not recommend these gauges to be used as a straight edge; that is, for the purpose of finding lumps and leveling up the Saw, but simply to be used for the purpose of taking the measurements above mentioned.



Cut No. 2

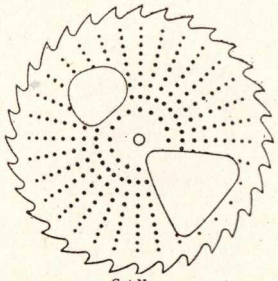
A Saw that has lost its tension will appear as shown in figure "2," and needs hammering, as shown in figure "3;" but, before beginning to hammer it, examine the Saw carefully all around, holding the Saw and straight edge as shown in figure "5." If any part is found to drop away more than the rest of the Saw, mark this part as shown in figure "4," and do not hammer as much, if any, at that place, until you have gone over the rest of the Saw with the round face hammer, as shown in figure "4." Examine the Saw again carefully as before, and, if any place is found that does not drop the required amount, mark around it, or any other place that might be found lacking in the proper amount of tension. When all such places are located and marked, go over the Saw, hammering lightly on each place. Then turn the Saw over and do likewise on the opposite side of each place. In every case hammer each side of the plate the same amount, to avoid dishing the Saw.



Cut 3

If, however, in the process of regulating the tension, you find the Saw to be a trifle dishing, lay it on the anvil with the full side up, and hammer lightly over body of Saw, as in figure "3," until you have made it perfectly flat on the log side.

In testing for the tension, be sure to have the straight edge at right angles with the part of the Saw that rests on the board, and the opposite edge which is being raised by the left hand, while the straight edge is held and gently pressed down with the right hand. The straight edge should not be allowed to lean to one side or the other, but held in an upright position, or it will fail to show what is desired.



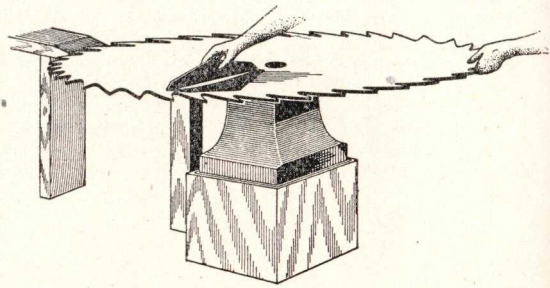
Cut No. 4

A straight edge reaching from the centre to rim of Saw, is the best to use when hammering to regulate the tension. When this straight edge is applied as above, the Saw should fall away from the straight edge, as shown in figure "5." This will show the centre of Saw to be stiff, as it should be to run properly and do good work. If a short straight edge of 6 inches long is held over the centre, and pressed down while the edge of the Saw is being raised, it should show the Saw to be nearly flat, or of equal tension at that part. We would state here that it is very seldom necessary to hammer inside the outer collar line.

When beginning to hammer, as in figure "3," see that the face of the hammer is ground so that the blow will be round, and do not strike too heavy, for it is better to go over the Saw several times, than to hammer too much at one time, and put the Saw in worse shape than it was before you began.

After going over one side, mark off the other side, and repeat the operation with as near as possible the same number and weight of blows as struck on the first side, and as nearly directly over them as possible. Now stand the Saw on the floor, hold it up straight, and test it with the long straight edge, as shown by figure "12," and if the hammering has been equally done on both sides, the Saw should be very nearly true. If, however, it shows full on one side, and dishing on the other, mark these places that are full.

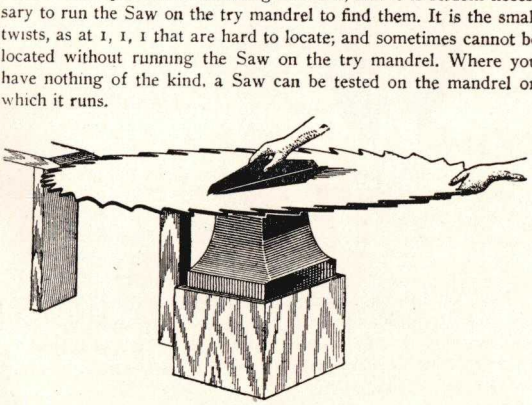
Place the Saw on the anvil with the round side up, hammer lightly on the full places, test again with the long straight edge, and, if it appears true, put it on the anvil and test it for tension, as before explained, to see if it has the proper tension If not, repeat the



Cut No. 5

operation with the round face hammer, and when you have regulated it to a proper tension, you will have accomplished the most difficult part of Saw hammering.

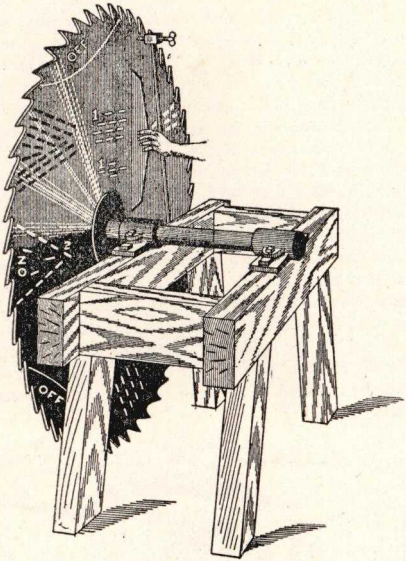
After again testing with the long straight edge, put the Saw on the try mandrel, if you have one—and we think every first class millman should have one—and test with short straight edge for running true Mark the places as they run off or on, as shown in figure "7," while turning the Saw slowly around, and, where the Saw runs off, lumps will be found most likely, as at 1, 1, 1, or what is termed "twist lumps," as at 2, 2, 2 of figure "8," or both may occur. These lumps must be taken out with a cross face hammer, the blows being struck so that they will be in line with the lump; that is, the mark or impression the hammer leaves, should run in the same direction that the lump runs as shown by the straight edge. A twist cannot be taken out with a round face hammer, neither is a round face hammer liable to twist a Saw On the other hand, by using a cross face hammer, twist lumps can be very easily removed, if the blows are struck in line with the lump, as above stated. The saw may also be thrown out of true by lumps running toward the centre, as No. 3, Fig 8. In this case the Saw will be on or off at points about opposite each other. This class of twists or lumps is usually located and removed in the process of flattening the Saw, and it is seldom necessary to run the Saw on the try mandrel to find them. It is the small twists, as at 1, 1, 1 that are hard to locate; and sometimes cannot be located without running the Saw on the try mandrel. Where you have nothing of the kind, a Saw can be tested on the mandrel on which it runs.



Cut No. 9

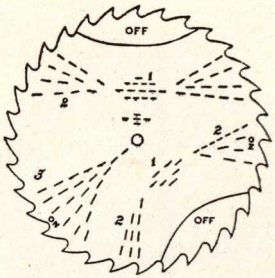
In removing these twist lumps, the hammering must be done carefully. If the hammer is of the proper weight, and the face properly ground, the Saw can be made to run true without altering the tension to any great extent.

The testing on the mandrel should be done with the full side of the Saw toward the pointer, and knocking down the lumps from that side will make the Saw flat.



Cut No. 7

Now, put Saw on the arbor, and, if for a high speed, it should sway gently from side to side in getting up to full speed, and will then run steadily and do its work properly. But if it acts as heretofore stated (that is, snaky and rattles in the guides) it needs to be more open towards the centre.

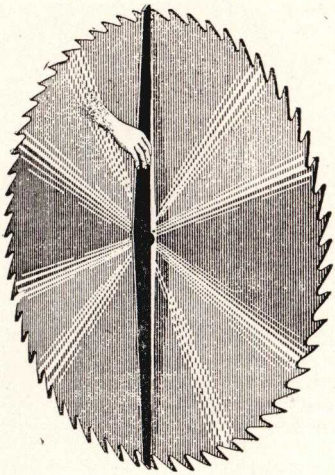


Cut No. 8

An experienced man, however, will stand the Saw on the floor, taking hold at the top edge, giving it a sudden shake, and if the centre vibrates and the rim stands stiff, he knows it to be open towards the centre. He will also test it by leaning the Saw over, to see if it falls away from the straight edge sufficiently, as shown by Fig. 9.

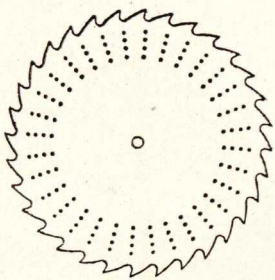
If the Saw is too open at centre, it will run from side to side, and will generally run out in taking off a light slab. After the first cut in a log, it will almost always run in.

Great care should be taken not to run a Saw when too open at centre, for if it should run out to any great extent, it is liable to become sprung at the collar line. In case the feed is fast, with good power the Saw is liable to crack around the edge of the collar. Where a Saw is too open at the centre, as above stated, it should be hammered in from the edge, as shown by Fig. 10, and the distance to hammer in from the edge depends on where the loose parts are on the Saw If the centre is loose to the first line, or the one nearest the centre, hammer from rim to that line; but, if the looseness runs out



Cut No. 9

to the next line, hammer only to that line, and so on. Or, the looseness may be irregular, as shown by Fig 11, and needs to be hammered as shown in the cut to regulate the tension. Then proceed with cross face hammer as before explained by 6, 7 and 8, before regulating the tension and final trueing. Do the same in case of buckling by burned spots or sharp lumps over the collar line. These may be knocked down by placing two thicknesses of strong, heavy paper on the anvil, and then by a few, well directed, light, solid blows you can knock down the lumps without expanding the metal, to the same extent as if straightened on the bare face of the anvil.

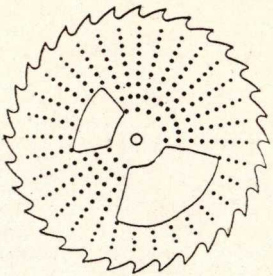


Cut No. 10

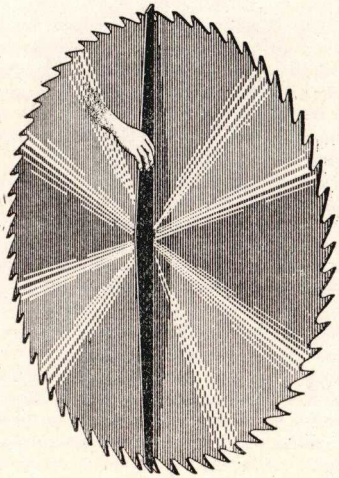
In hammering with the round face hammer, it is very important to have the blows distributed evenly over the part to be hammered. It is better to begin at or near the collar line, and hammer on a straight line out to within 3½ or 4 inches of the rim; then move over as shown by lines on cut 11, and hammer back to the centre again. By hammering on uniform lines back and forth over the Saw, you avoid putting in lumps that would require much work with the cross face hammer to true up the Saw again. This matter of doing the hammering uniformly over the plate is one of the most important features in connection with the adjustment of Saws, for hammering too much in one place would cause a lump or loose spot that would be hard to take out, which, if left there, would likely cause a blue spot to appear at this place, caused by the friction while in the cut.

If it is necessary to go over the Saw more than once for tension, hammer between the lines already operated upon.

The dressing of the faces of the hammers is an important matter. The round face should be dressed so that if a blow is struck on the oiled surface of the Saw, it should show about ½ inch in diameter, and the cross-face so that it should show about ¾x⅜ inch, for a sharp cutting blow is not effective in either knocking down a lump, or stretching the metal.



Cut No, 11



Cut No. 12

In conclusion we make the following suggestions to beginners: Do not be discouraged by the failure of first attempts. Try to make yourself perfectly familiar with instructions, and persevere in properly applying them

Carefully study the amount of opening the Saw requires at the centre for tension to suit the speed and feed, and to regulate this always use the round face hammer.

Beginners in the art of Saw hammering, should begin with a small Circular Cut-off Saw—for this class of Saws are, as a rule, given very little attention in the mills—one that can be very easily handled Go through with the operation as instructed, and, after succeeding in putting this in good shape by hammering so that it will run true and steady without chattering in the cut, you will have advanced well in the art of hammering, and will be able to operate on larger Saws without the same risk of failure.

Wide Band Saws.

In the manufacture of Wide Band Saws it is not possible to subject the Saws to the same strains that they receive in mills. They are liable to change more in the first run than on any succeeding one and should be gone over carefully the first time they come off. In fact if the practice of running a Saw only half an hour on its first run then taking it off and touching it up wherever necessary, were more generally used, there would be fewer cracked Band Saws, and their life would be greatly increased.

All first class filers and millmen know that excessive speed, too much tension, case-hardening or glazing from the use of an unsuitable emery wheel, gum adhering to the face of the wheel, crystallization from too heavy hammering, cuts on the surface of the Saw from sharp faced hammers, vibration of either machine or Saw, sharp angles in the gullets, imperfectly adjusted guides, backs of Saws being too long or too short, excessively cross aligned to make them "track," in sufficient throat room and hook, crowding the Saw against the back guard, will cause a Saw to crack, Yet, notwithstanding the fact that all Band Saws are more or less subject to these conditions, too often the cause of fracture is attributed to the quality of the steel, or over-hardness.

It may be said in justice to the Saw manufacturer, that due consideration should be given the fact that the Saw is only *one* item, while each and every one of the above named causes is a large factor in producing cracks in Band Saws. If the Saw will stand swaging, and the swage can be compressed without fracturing the steel, it is conclusive evidence that the steel is tough, and that the temper is not too high.

Many letters are received from Band Mill owners and operators asking advice as to the best method to fit, tension, and operate the Saws, in order to obtain the best results in capacity and quality of lumber made, and, at the same time, get the most wear out of the Saws.

It is almost impossible to lay down rules that will fit all cases, or answer correctly any one of them, without knowing the exact conditions under which the Saws are to run, but we will give a few of the most important points in connection with the care and management of Band Saws, which if followed out carefully, will aid those who have neglected any of these points

Assuming that you have a good mill, built by a man who has learned by experience so to proportion and distribute the metal in the machine, that the Saw can be strained up to the proper point without springing or distorting any part of the machine, and yet have ample margin of strength to properly stand the additional strain put on it by vibration—such a mill is the only one from which a man can expect to get best results.

It is well known that vibration is one of the greatest causes of bad results in the use of Band Saws, and, knowing this, great attention should be paid at all times to the wheels and their shafts, the journals, and boxes. The wheels must be round, plumb, and in perfect balance, and the shafts must run free in their boxes, with no lost motion.

Sawyers frequently complain that their Saws, which have been doing good work and giving perfect satisfaction, begin to crack. This is not so surprising when one considers the great tensile strain the Saw is subjected to while running, and the great number of times it is bent and straightened in running over the wheels, all of which eventually cause crystallization of the steel, and tends to crack the Saw

None of the leading Band Mill owners are putting so much crown in their wheels as they were a few years ago, and some of

them are making flat wheels. Each style has its advocates, and will give good satisfaction when properly handled. But, as some of the leading mill builders give 1-64 in. in a 10 in. face wheel, it seems a question of education or preference on the part of the operators. However, it is easy to see that the more crown there is to the wheels, the more tension will be required, which means that the Saw will need more hammering and rolling, consequently will not be so flat, and necessarily will need more kerf to clear the plate. Saws kept in this condition are more liable to crack.

Perfectly uniform tension is an important factor in the care of Band Saws, for, if the Saw has fast and loose places in it, the tendency to crack is largely increased, the fast spots cracking from undue strain, and the loose spots from constant buckling of the surplus metal.

The tools required for the care of Band Saws are a roll, a cross face hammer, and a round or dog head hammer, each weighing about 2½ pounds.

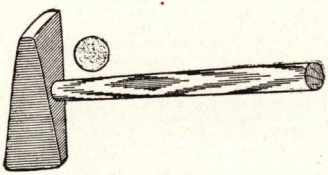


Fig. No. 9

The face in line with the handle of the hammer is termed the long face; the face at right angles with the line of handle, is the cross face. A blow struck with this hammer, when held in the position as shown in Fig. 16 is a long face blow, and, by turning the hammer over without altering the line of the handle, but reversing the position of the faces, cross face blows can be struck with it.

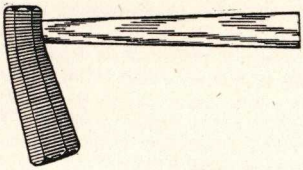
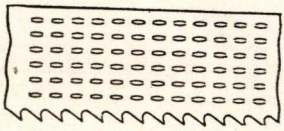


Fig. No. 10

The round face or "dog-head" hammer has but one face, which, as its name indicates, is round. It is used chiefly for adjusting the tension. This face must be ground convex, of an even sweep, so as to strike a round blow exactly in the centre of the face, the mark of its blows to be about ⅞ in. to ½ in. in diameter.

By the use of the cross-face and long-face hammer, the operator can, without changing his position, make all the forms of blows shown in cuts.



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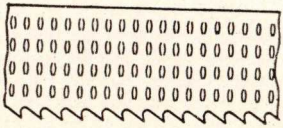

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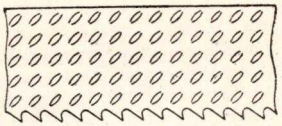

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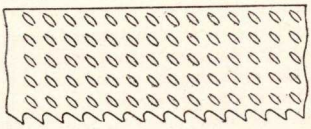

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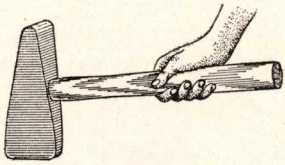


Cut No. 16

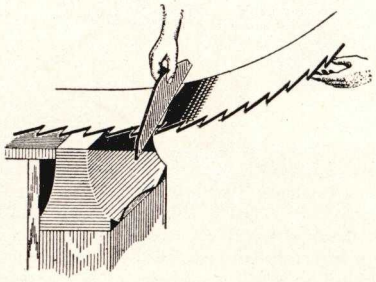
To become accustomed to the use of the hammer, take each hammer in turn, grasping it firmly by the handle about two-thirds its length from the head. The thumb and forefinger must be on either side, not on top, as in Fig. 16. Strike the anvil without moving elbow or shoulder—the only movement should be in the wrist, with the three fingers underneath the handle. This is important, as the quality of the work will depend largely on the accuracy with

which the force can be regulated, and the distribution of the blows, heavy or light. Their power must be governed by the movement of the fingers and wrist. Too much attention cannot be given to the matter of becoming proficient in the command of the hammer.

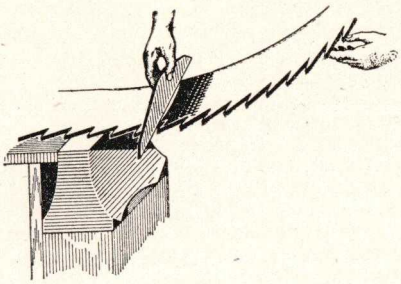
Having now learned to bounce your hammer, you may proceed to the practice of Saw hammering, and the adjustment of Saws. To experiment, take a piece of worn-out Band Saw, about five feet long, and lay it on the anvil. Take a straight edge and place it edgewise across the Saw. Beginning at the end farthest from you, find the largest lumps first, drawing the level over the entire extent of each lump. Lay the level down and take the hammer, and, by a careful distribution of blows, proceed to knock down the lumps, using blows heavy or light as the case may require.

Repeat the operation until you have gone the entire length of the piece; turn it over and repeat the operation on the other side. The direction of blows is across the line of the straight edge (See Fig. 17) and must always be so; hence, as your instructions were to place your straight edge square across the Saw, the blows you have applied, which run lengthwise of the Saw, are long-face blows. (See Fig. 12.) Whichever face of the hammer you use, the name of the blow is determined by its direction. (See Cuts 12, 13, 14 and 15.)

Having taken out the long-face lumps (Fig. 12) go over the plate carefully a second time to see that the work has been properly done, then proceed to take out the cross-face lumps. (See Fig. 13.)



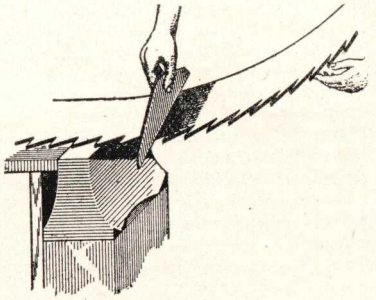
Cut No. 17



Cut No. 18

To gain a knowledge of the tension as applied to the Band Saw, lay the piece you have already been working on, lengthwise, and take hold of one end, letting the farthest end rest on the plate back of the anvil. Grasp tightly, and bend to a curve by a pressure of the hand (Fig. 17 shows the manner of holding the plate.) When the straight edge (Fig. 4) is placed across the Saw, the parts drawn to the straight edge are "fast," and the parts that fall away from it are "loose," and the parts that neither draw to, nor fall away, are "stiff," that is, they show no tension (See Figs. 17, 18 and 19.)

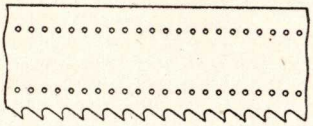
The lesson upon which you are now engaged is to make this piece "stiff" or flat, without any tension. To this end, first find a "fast" place by bending in the manner before described. The "fast"



Cut No. 19

place will show in the manner that a lump shows when the plate is lying flat (See Fig. 18). Having located the "fast" places, and noting their extent, turn the plate over, and it will be found they show in exactly the same manner as on the other side of the plate. With the round hammer, hammer equally on either side, try with the straight edge, and proceed until you have taken out all the "fast."

The "loose" places are those that will drop away from the straight edge when the Saw is bent. (See Fig. 17). These are removed by hammering on either edge of the plate (See Fig. 20). Hammer the piece until it shows neither "fast" nor "loose" places, but shows "stiff" throughout, as described above.



Cut No. 20

Now proceed to "level up;" that is, knock down any lumps you may have made in using the round-face hammer. When the blade is bent under the level as previously described and shown in Fig. 17, a "fast" place shows where the blows should be placed.

The above illustrations and advice are for the beginner, to show how tension may be applied to the Saw with the hammer, but we recommend the rolls, which will do the same work, except in a few instances, for the reason that every blow of the hammer shortens the life of the Saw by closing the molecules of the steel, robbing it of its lasticity, thereby causing brittleness and inviting cracks.

Twists.

There are two kinds of twists, the long-face and the cross-face. The long-face is that which must be removed by the use of the long face of the cross-face hammer applied diagonally across the blade, as in Fig. 14. The cross-face twist is that which must be removed by the use of the cross face of the cross-face hammer applied diagonally across the blade, as in Fig. 15. Now, as the long-face produces a cross-face twist, the opposite blow (cross-face) will remove it or vice

versa. The same rule applies to twists as to tension. Both sides of the blade must be equally hammered. Before removing either twist, place the straight edge diagonally across the blade, and you will find that it shows a lump at right angles to the straight edge. Changing the position of the straight edge to an exactly opposite diagonal direction, you will find a hollow. Without changing the position of the straight edge, turn the piece over, and you will find a hollow on either side, and, in like manner, with the straight edge in the opposite diagonal direction you will find a lump on both sides, showing that both sides must be hammered to remove the twist.

In removing twists, care must be taken not to hammer too much, or an opposite twist to the one removed will be produced. Also note that when the piece is lying flat on the leveling block, the parts which do not lie flat are at opposite corners of the piece. Where there are no twists, and the hammering is done any other way than either parallel with the length of the blade, or squarely across it, a twist is produced.

It would be presumption to expect that one can take a Saw and adjust it with any hope of success, without some practical knowledge, and this you cannot expect to obtain by working on new Saws as they come from the manufacturer, or trying to adjust them in their first deviation or flatness. Try to master the above rudimentary instructions. The more practice, the better able one will be to keep the Saw in working order.

Using Saw When Extremely Dull.

A Saw should never be run when extremely dull. Normal feed when the Saw is dull, is the same as feeding a well sharpened Saw beyond its capacity. Therefore, never neglect this important part of your labors. Always keep Saws sharp and in good condition.

Not having set or clearance enough the closing of the grain or fibre produces heat at the base of the teeth. This, if in undue degree, causes expansion at the edge of Saw, which results in causing a wavy or vibrating motion likely at any time to start small cracks at the bottom of gullets.

When the set or swage is light, the lumps on the Saw, even when passed over as of no consequence by the straight edge, will show bright and clean, while the hollow places are of a dull color.

Watch your Saw carefully, and, when these lumps appear, take the blocking hammer and straight edge and go over the Saw carefully, removing them as before instructed.

By watching these indications, and by a careful use of the straight edge and hammer, you will, by a little practice, produce a flatter Saw than by any other means available to the millman. In all Saws, Band, Gang, and Circular, the most essential quality is a steel and temper that will swage and hold the corners and at the same time be stiff enough to stand up to its work and hold its tension for a reasonable length of time. We claim for our Saws that in this respect they stand at the head of all other makes.

Unequal Tension.

This is the cause of much trouble and breakage, but, as you gain in experience, it is one that is easily remedied. The Saw may work well at first, and yet every time it is used or filed, its tension may be altered, perhaps not to any great extent while the Saw is at work, but the inequalities can very easily be detected by the use of the tension gauge. Constant care and watchfulness will teach the need of a little "touching up" here and there, as the case may require. It is in this way, line upon line, that one gradually becomes master of his work.

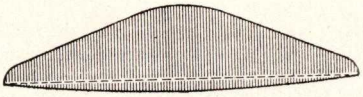
The Tension Gauge.

For the benefit of the few who are not acquainted with the use of the tension gauge, a brief explanation of its use in connection with the adjustment of Band Saws is timely and important.

When the speed of the Band Saw was increased to 10,000 feet per minute, together with the increased feed, it was found that in order to have the Saw stand the increased tensile strain, it was necessary to have a deep, well regulated tension. Loose tension beyond a certain degree will carry down the "fast" places so they cannot be detected by the straight edge. With the tension gauge, which is convex to fit the amount of tension in Saw, the most minute portions of "fast" can be located.

The form of a tension gauge may be seen by reference to Fig. 4. The edge "B" is convex, by the use of which is secured a uniform tension. The sweep of the convex edge, fitting the declension, is governed by the amount of tension the Saw is found to need. The

convex side should always fit the depth the Saw dishes or drops when bent to test the tension, as shown in Fig. 17



Cut No. 4

Leveling The Saw.

Place the Saw in position for rolling, mark the saw and begin by knocking down the lumps, both "long-face" and "cross-face." This done, take the tension level in your right hand, place your left under the blade, raising it to nearly the height of your shoulder, and place the tension level squarely across the blade at arm's length, as shown in Fig. 17. The "fast" portions will lie closely to the gauge, and show in about the same manner as a lump shows under the straight edge when the Saw is lying flat Now proceed according to instructions on page 63. You cannot turn the Saw over as you would a short piece, therefore be careful and not hammer too much so as to drive Saw through

This is the time to exercise qualities of perception and memory, for when you have gone around the Saw on one side, take the other, and again using the straight edge begin at the joint or chalk mark and hammer down all the short lumps and high places as nearly as you can in like amount as on the other side.

To make the tension less or stiffer, roll gently on the edges of the Saw from end to end, not running nearer the edge or bottom of gullets than 1½ in To put in more tension (to "open up") roll on the inner portions of the blade (See instructions on tension, page 69).

Uneven Breast.

This trouble is indicated by hollow and high places—not by uneven width Blades may have parallel edges, but, not being in a straight line, causing a lateral movement when the Saw is in motion, thus presenting an uneven and ever-changing cutting front. To draw these places out straight, take a long straight edge, six feet long (this is a convenient length—one shorter than this would be too short) place it against the back edge of the Saw; locate the point most out of line, making a chalk mark on the opposite side to where the straight edge rocks. After marking the entire length of the Saw, you may find that it has one continuous bend. This is a condition necessary in a great many cases. That is, the back edge should be a trifle longer than the toothed edge, but it should be uniformly so throughout the entire length of the blade, and our experience teaches us that the crown of the back should not exceed 1-32 of an inch in six feet. If you find it does exceed this amount, or the amount which your mill seems to require, roll from one end of the blade to the other, working carefully no matter which course you take. Begin at the edge on the hollow side of the plate, rolling gently from edge to centre. By this means, with care, altering the tension may be avoided.

Straightening The Braze.

In our observation in mills, we find frequently that Saws crack in close proximity to the joint. On examination we find the part "fast" at or near the location of the crack.

Pressing the joint properly is the most difficult part to learn of the entire task. The method to follow in this case is hard to describe. During the process of brazing, the hot irons hold the Saw so tightly that there is no room for expansion under their pressure. Outside the irons(as far as the heat extends, expansion has free play, and shows in lumps on either side of the joint, which is now the contracted or fast part. Therefore, after brazing roll the braze from centre to edges until Saw lies flat or nearly so.

With the "dog-head" hammer, hammer on the full places which appear like lumps, but in reality are fast places, which, after being opened up to the desired tension, will lie flat. After the joint is made to lie flat, go over this part carefully with the straight edge, locating and knocking down any lumps you may find. Then dress both sides with file, being careful not to file too much and make the Saw thin at the braze.

Avoid unnecessary work by using care not to go at it in a "haphazard" manner. Have a reason for every blow, trying to put it in the right place every time. Do not be afraid of opening the joint. If properly joined together, it is now an integral part of the Saw, and will stand as much as any other portion. If it comes undone, now is the best time for it to do so. This is a test for the quality of your work—let it be good or bad.

The joint having been made perfectly flat, trim it to even thickness, and then adjust the tension and breast according to instructions already given.

Be a close observer, and let each joint, straightened and adjusted, be an object lesson in the tensibility of the steel.

Tensioning Of Band Saws.

The tensioning of Band Saws is an important matter, and one that can always be improved on. The longer the experience and practice one has, the more perfect he becomes. In starting in, one should always begin right, and in doing so it will be much easier to follow the right course.

In beginning the operation of tensioning a Band Saw, lay the Saw on the bench. Take a straight edge and go over the Saw the entire length, and see that there are no small lumps, also have Saw perfectly level. Then place Saw in the rolls, starting at the braze. Roll directly in the centre the entire length of the Saw. When this is accomplished, shift the roll 1 in. to one side and go around the entire length of the Saw as described. Then place the roll 1 in. the other side of the centre going the entire length of the Saw, and so on, working from the centre to the edges, not going any closer to the edge than 1½ in., leaving what is commonly known as the tire or strain line on the toothed edge.

Should the tension be uneven in the Saw, it is not advisable to go all the length of the Saw with the roll, but just over the fast places Roll very lightly at first until perfectly acquainted with the hardness of the plate, as the tension is much more difficult to take out than to put in. Should there be too much tension in Saw, run the roll lightly around each edge of the Saw about 1 in or 1½ in. from the edge. This should be done very carefully though, as one is liable to take out too much of the tension and make the strain line of the Saw too loose.

If proper care is used in handling the roll, it will save the filer considerable work on the block with the hammer, as the Saw can be very easily dished one way or another with the roll, thereby causing considerable leveling that could otherwise be avoided.

The circle of the tension in an ordinary Band Saw should conform to a 40 or 45 foot circle; that is, a tension gauge, convexed to a 40 to 45 foot circle, should fit or conform to the declension or "drop" of the blade, when tested as shown in Fig. 19. This is about the average tension used in all mills with flat wheels. Any more tension than this is liable to give great trouble by cracking, as the tensile strain is too great on the strain or tire line, therefore cracking while running over the wheel.

The Saw when strained on the Band wheels, should lie nearly flat all across the wheel, but strained a little heavier on the toothed edge than at any other part. Saws that rest too heavily on each side, and rise up in the centre from the wheel, do not do as good work as a Saw that is nearly flat, as the body of the Saw is not stiff enough to hold the teeth in a straight line, thereby allowing them to lead one way or the other

Straightening And Leveling Band Saws.

To level a Band Saw lay it on a bench, inside resting on levelingblock perfectly true. With the straight edge, about 10 in. to 12 in., start at the braze or chalk mark on the Saw, taking a portion about three feet long, or the length of your leveling block, and go over it very carefully, pounding down the high places only, or places where you may find small lumps. After going the entire length of the Saw, should there be any places where daylight can be seen under straight edge, take Saw and hang it over the rack which is above your filing bench, so as to have the outside of blade rest against the

leveling block. Start again at the braze or chalk mark and go over the entire length of the Saw the same as on the other side, being careful not to hammer too heavily, as it will cause extra work on the other side again.

After having the Saw perfectly level on both sides, lay it down again on the bench in the former position, take straight edge six feet long and lay it against the back of Saw. Should the straight edge rock on the Saw, mark the places where the straight edge rocked, going over the entire length of Saw in this manner Should it be an even convex or crown on the back the full distance of the blade, and not be too great a crown, it would be advisable to fit the Saw in this manner. We should not recommend a greater crown than 1-32 in. in six feet. Should a low place be found on the back, which will fall away from your straight edge, mark the low place for the full distance. Then start with roll, beginning at one end of chalk mark in the centre of blade, and roll one deep roll through centre of Saw the full distance of chalk mark, then go 1 in. or 1½ in. to the side next chalk mark, also 1in. to the other side, but go very lightly Again, go 1in. farther at the edge where chalk mark is and take another roll Continue this onto the edge, rolling evenly. By the time the last roll is taken along the edge where the chalk mark is, the hollow places will become straight and lie close to the straight edge. Should the straight edge rock too much, or the back be too high at points, continue a like performance on the side of plate opposite the high places.

In straightening uneven brazes in Saws, it is always best to first place the roll in centre and work to the edge, rather than start at the edge and go to the centre, for, in working from the centre to the edge of the blade the filer can follow much closer with the tension gauge the exact amount of tension he has in the blade, whereas in working from the edge to the centre, it is very difficult to keep track of the tension being put in.

Straight Edge And Tension Gauge.

The straight edge should be a piece of steel from 10 in. to 12 in. long about 15 or 16 gauge, and about 1½ in. wide. It can be made the same width all the way along, or it can be made wider in the centre and taper at each end, which is much more convenient to handle The filer should always have what is known as a "try gauge,"

so as to be able to fit the straight edge as it wears, which it naturally will, being drawn over the Saw many times a day. For dressing the straight edge, it is advisable to use a mill file, and draw it very carefully along the full length of the steel so as not to make lumps and hollows.

Tension Gauge.

The tension gauge is made in somewhat the same manner as a straight edge, with the exception of the edges, which are convexed and concaved. A tension gauge should be from 40 to 45 degrees convex on one side, and concave on the other in like manner, so that when the Saw is raised with the left hand to a position which is customary in trying tension gauge on a Saw, the convex side of the gauge should fit the proper tension in the blade.

In like manner to concave a Saw, when Saw is bent down by right hand to about the same angle as it was raised up, the Saw will also fit the concave side of the straight edge, thus giving the filer absolute assurance that the blade is tensioned perfectly even on both sides.

In tension gauges, the same as in straight edges, the filer should always have a try gauge, and be very careful to see that the tension gauge is kept perfectly true, with the same circle on both ends, so as not to have more tension on one side of the Saw than on the other. If this is followed up carefully, it is much easier for a filer to test his tension and to see when he has the proper amount in the Saw, for many filers make hard work for themselves in having improper tension gauges.

Adjustment Of Automatic Grinder.

An automatic grinder should be set so that the Saw when on the machine is parallel with the bench. If there is plenty of room in the filing room, it would be wise to set the grinder some 10 or 12 feet from the bench so as to allow plenty of room for turning the Saw It is always preferable to set the grinder so that it will be inside of the Saw when grinding. In this manner there may be considerable room saved.

When the Saw is hung on the wheels, have the wheels high enough so that Saw will just rest lightly on the guard that holds it up to the emery wheels. If resting too heavily on this guard, it will

wear it, or be liable to wear the back of Saw. Saw should run through the automatic grinder easy enough so as not to bind, at the same time being tight and stiff enough so that when the finger releases the teeth it will not slip back, therefore overcoming any danger of spoiling the teeth.

Grinders have a variety of cams for different shape teeth, and if a filer is careful in selecting the proper cam, it will enable him to keep the proper shape of tooth on his Saw with little difficulty. There are a number of filers who have considerable trouble keeping the proper shape of tooth on Saw, and it is principally due to not having the proper cam on the grinder.

The finger should always be carefully watched so as to press the teeth at the same point all the time, thereby making an equal and uniform back on teeth.

With little practice and close observation, filers will get to use a grinder with a great deal of satisfaction. The improper use of a grinder will soon make an uneven breast on the Saw, while, on the other hand, if a grinder is working perfectly, a Saw may be kept perfectly straight and sharp without the use of a file, which is much more preferable. No matter how accurate a filer may be in filing a Saw by hand, there is nothing so accurate as a machine, and if a Saw can be finished up on a grinder to go on the mill, it is bound to be more perfect than when it is fitted up by hand.

The filing clamp should be set either on the side the grinder is on, or the opposite side, as the hand of the Saw may require. It is always preferable to work on the outside of the Saw, this giving more room. However, it depends wholly on the light in the filing room as to what position to work at filing clamp. Filing clamps are used principally to clamp the Saw while swaging and shaping. In swaging a Saw, start as far back on one side as possible where the Saw is straight. Mark a tooth to start on, and after the Saw is clamped tightly in vise, swage the distance of the Saw as far as possible without swaging over a wheel, or where a Saw is bent out of a straight line. After going this distance, take the shaper and follow up the swaging. See to it that the shaper is held down tight to the teeth all the time, so as to go over every tooth the same way In swaging and shaping Band Saws great care should be taken that the dies of swages and shapers are kept in perfect shape all the time so as

to fit the teeth without spring the steel in any one way, as there are a lot of corners and points of Saws broken off by improperly shaped dies and anvils of swages.

Turning Off The Face Of Band Mill Wheels.

The face of Band mill wheels for single or double cut mills should be perfectly flat, or as nearly so as possible, as this is a very essential thing in the accuracy of Saws running, and in the life of Band Saws. There should be especial attention paid to this to see that the wheels are kept in perfect condition. It is advisable to turn the face of Band wheels at least once a year, and, if possible, twice, There is not much to grind off of them in that time, and they can always be kept true, for a Band wheel will sometimes get out of true with ordinary use. If great care is taken in this, it will save the filer a lot of extra work on Saws, and also save a great many dollars' worth of Saws.

Adjustment Of Band Mills.

The adjustment of a Band Mill is another very essential thing, If a mill is not in good plumb, or in true line, no matter how good a mill, or how well it is built, it is impossible to do good work.

In setting up a Band Mill it should be set plumb, or as nearly so as it is possible, with the V carriage track, so that when the mill is complete and the Saw put on, it will hang perfectly parallel with the track. Unless this is the case, it is impossible for a Band Saw to cut true lumber, as you cannot lead a Band Saw with the guides. The head blocks on a carriage should be set perfectly true, and parallel with both track and Saw. It is advisable in lining head blocks, to measure the distance from the teeth of the Saw to each head block, as the carriage may be run slowly along the track. In doing this, the head blocks will all be the same distance from the Saw as when passing.

Saw Guides And Guards On Band Mill.

The guides through which the Saw runs, should be of friction less metal, such as Babbit metal, or something of this kind, and should not rest tightly against the Saw when strained, but should have clearance enough to hold the Saw from running in or out of

the cut, but not to bind it, as this would be the means of case- hardening or crystallizing the steel more quickly than by any other possible means.

The guard, or what is known as the back guide, for a Band mill, should be used only as a safeguard against running the Saw off the back of the wheel, but it never should be set up so that the Saw will run against it. If in any way the Saw may run back against the back guide and crystallize or case-harden, it is advisable to take an old piece of emery wheel, while the Saw is in motion, and hold it tightly on the back of the Saw for some minutes, turning it around to make the back of the blade perfectly round and true, and at the same time taking out the case-hardening or crystallization that may have been put in by running heavily on the back guide This will be found to prevent cracks.

Crystallization Of The Saw.

Crystallization of a Band Saw is caused in various ways. Saws running on and off steel face pulleys at a rapid rate will have a tendency to crystallize the blade. Saws running through guides have a tendency to crystallize. Slivers, sawdust, or any fibre of that kind getting between the Saw and the side of the log, also have a tendency to crystallize the steel to some extent. Band Saws are more frequently crystallized by the use of improper metal in the guides, or by the guides being improperly set.

Great care should be taken when a Band Saw is strained on the mill and running, that it runs perfectly free, does not oscillate or vibrate, and is perfectly parallel with the carriage track This being closely watched, and the mill, Saws, and carriage kept in perfect line, it will relieve the filer or operator of a lot of unnecssary work.

We trust that this will be of helpful assistance to mill owners and operators, as we feel it has been to us. We would suggest in conclusion, that Band Saw operators take great care, and exercise patience, in the handling and manipulation of Band Saws, as we have always found it is much better to go very slowly at the start until one knows perfectly the surrounding conditions, and we believe it is better to go slowly in experimenting in new ideas, until fully accomplished in the care of Saws.

Fitting And Running Small Band Saws.

The breakage of small Bands in woodworking plants is the source of much annoyance to the operators of such plants. Among the most frequent causes of breakage we name the following.

The use of Saws unsuitable gauge for the work; pulleys being out of balance, or out of true; the use of an improper arrangement for giving the Saw the required strain on the wheel; not slacking Saw after use thus preventing the free contraction of Saw blades on cooling down (they should always be left a trifle slack when not in motion) the joint not being the same thickness as the rest of the blade; the back guide being too close, so that the Saw is constantly rubbing against it, consequently case-hardening the back of Saw and cracking it. The back guide should never be so close that the Saw will come in contact with it It is only placed there as a matter of precaution, and when the Saw will not stay on the wheel without being held there with the back guide, there is trouble somewhre, which should be located and corrected.

Saws should never be filed to sharp corners at gullets; they should always be rounded out with a round file or emery wheel.

Working dull Saws, feeding work onto the Saw beyond its cutting capacity, allowing the sawdust to collect on the face of wheel, thus causing it to become lumpy and uneven, stopping or starting a machine too suddenly—especially when using a light blade—will almost certainly snap a Saw in two.

When a covered wheel is used, it should be frequently examined to see that it is perfectly true on the face, as a covered wheel is much more liable to get out of true than a solid one. We think leather is preferable to rubber, as it can be trued very easily by turning.

Saws should be frequently breasted to keep them perfectly true on the toothed edge, and the teeth of uniform depth. For ripping, the teeth should be filed perfectly straight across; but where rip and cut-off work are both done on the same Saw, it is well to file the teeth a trifle flemming. Run as narrow a set as possible, but always have enough to clear the plate and prevent it from binding in the cut, as this would surely cause the Saw to crack. Soft or pitchy timber requires more set than timber that is free from pitch. Hard wood requires the least of any

All Band Saws having teeth of sufficient size to admit of swaging, should be fitted full swage. There are many kinds of swages used for this class of Saw fitting, and with due care any of them can be used with very good results. The bar and hammer, and the upset, have, however, almost entirely gone out of use in the swaging of Band Saws, except where the upset is used in connection with other swages of the roller style We think every Band Saw filer should have one, as they are very useful in case the Saw runs onto a stone or gravel, and a little more spread is needed than can be obtained by one operation of the roller swage. In a case of this kind the upset can be used to good advantage by placing it on the point of tooth, when, with a few light blows of a hammer, the point of tooth can be spread a little, and, at the same time made thicker Thus one application of the roller swage will draw the point of the tooth out sufficiently to give a good full swage. The Saw should be kept perfectly true on the cutting edge, and the points of uniform width throughout. To regulate the width of points, we recommend the use of a "Shaper," as it gives a better and more uniform shape to the teeth (See cuts of section of Band Saw teeth.)

Cut H. Cut I Cut J. Cut K.

Referring to the sketches H, I, J, and K, which illustrate full swage, the tooth marked "H" represents the ideal shape, both in swaging and side-dressing. The cutting edge of the tooth only should come in contact with the wood, and this cutting edge should have clearance both downward and backward from the point. This double clearance can be more properly secured by using a swage shaper.

Tooth "J" represents a point improperly side-dressed, the swage running too far down the face of the tooth, and not having the necessary amount of clearance.

Tooth K represents tooth J after striking gravel or some hard substance, by which part of the corner was knocked off, leaving the swage widest below the cutting point. In fact, it bulges out in such

a manner as to constantly rub and crowd against the side of the cut, raking the timber and leaving bad ridges upon it. This also causes the Saw to be crowded out of line.

An examination of cuts H and I, illustrating a tooth properly side-dressed and before and after striking gravel, will show that, although part of the clearance has been removed, there is yet enough left to prevent the body of swage from rubbing. This demonstrates that the points of teeth at all times should have ample clearance, so that nothing but the extreme point can possibly come in contact with the wood. On the other hand, they should be sufficiently stout so as not to crumble off in striking a hard knot.

This cut illustrates some forms of teeth used in Band, Gang and Band Re-saws. Any of the up-to-date Saw sharpeners can be readily adapted to produce them.

Simonds Manufacturing Co.

Main Offices and Works,
FITCHBURG, MASS.

Western Ave., and 16th and 17th Sts.,
CHICAGO, ILL.

40 Murray St., NEW YORK CITY.

85 First St.,
PORTLAND, ORE.

119 Jackson St.,
SEATTLE, WASH

Simonds Mfg. Co., Ltd.

301-303 Tchoupitoulas, St., ... NEW ORLEANS, LA.

Simonds Saw Co.

31 Main St., ... SAN FRANCISCO, CAL.

Cable Addresses,
SIMONDS, Fitchburg.
SIMANCO, N. Y. City.

See also our Code in back part of Catalogue.

On application, we will furnish order blanks for Saws or Knives of all kinds, and printed matter fully illustrating any goods not shown in this catalogue.

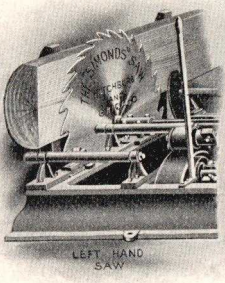
Orders sent to any of our above seven Houses will receive prompt and careful attention.

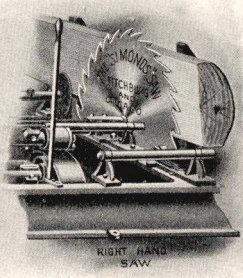
WARRANTY.

Each saw is warranted perfectly true, or as true as it is possible to make it; free from flaws and seams. If found to be defective in any of these particulars, it may be returned to us, and, if on examination we are satisfied the saw is at fault, all necessary repairs will be made free of charge, or a new saw given in exchange, provided it is returned within 30 days from delivery.

The practice of using a cold chisel or punch for retoothing a saw is almost certain to distort or crack the plate, and *corners filed square in the gullet of the tooth will frequently produce the same result*, particularly in frosty weather. Our warranty does not cover saws breaking from either of these causes.

Circular Board Saws.





N. B.—Standing in front of a Circular Saw with the Saw revolving towards you; if the log passes to the right of the Saw it is a RIGHT-HAND Saw; if to the left, a LEFT-HAND Saw, as shown above.

The Average Speed of Circular Saws.

Diameter Inches.	Revolutions per Minute.	Diameter Inches.	Revolutions per Minute.
8	4,600	40	980
10	3,920	44	890
12	3,260	48	815
16	2,450	52	750
20	1,960	56	700
24	1,630	60	640
28	1,400	64	600
32	1,225	68	560
36	1,080	72	530

The above table is figured on a rim speed of 10,000 feet per minute.

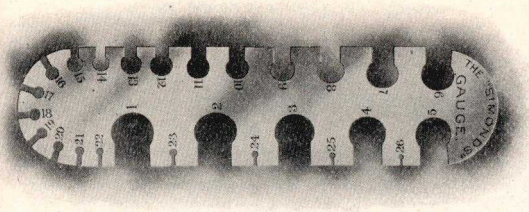
The Standard Number of Teeth in Circular Saws

Diam. Inch.	Splitting.	Cut-off.	Diam. Inch.	Splitting.	Cut-off.
4	38 to 40	100 to 120	24	34 to 36	72 to 80
5	38 to 40	100 to 120	26	32 to 34	72 to 80
6	38 to 40	100 to 120	28	32 to 34	72 to 80
7	38 to 40	100 to 120	30	32 to 34	80 to 90
8	38 to 40	100 to 120	32	32 to 34	80 to 90
9	36 to 38	90 to 110	34	32 to 34	80 to 90
10	36 to 38	90 to 110	36	34 to 38	80 to 90
12	36 to 38	90 to 100	38	34 to 38	80 to 100
14	36 to 38	90 to 100	40	36 to 40	80 to 100
16	36 to 38	80 to 90	42	36 to 40	80 to 100
18	34 to 36	80 to 90	44	36 to 40	80 to 100
20	34 to 36	80 to 90	46	36 to 40	80 to 100
22	34 to 36	72 to 80			

For Mills running Saws	550 Revolutions or less. 4 inch feed or less.	600–700 Revolutions. 6 inch feed	700–800 Revolutions Over 6 inch feed.	
Diam. Inch.	Splitting.	Splitting.	Splitting.	Cut-off.
48	24 to 36	34 to 40	48 to 60	80 to 100
50	26 to 38	34 to 42	50 to 70	80 to 100
52	28 to 38	36 to 44	52 to 80	80 to 100
54	30 to 40	36 to 48	54 to 80	90 to 120
56	34 to 44	36 to 50	56 to 90	90 to 120
58	36 to 46	40 to 52	58 to 90	90 to 120
60	36 to 48	42 to 60	60 to 100	90 to 120
62	. . . . .	44 to 60	60 to 100	100 to 140
64	. . . . .	44 to 60	60 to 100	100 to 140
66	. . . . .	48 to 66	72 to 100	100 to 140
68	. . . . .	48 to 68	80 to 100	100 to 160
70	. . . . .	48 to 68	90 to 100	100 to 160
72	. . . . .	48 to 72	90 to 100	100 to 160

Diam.	Resaws.	Edgers.	Diam.	Shingle. Reg.	Heading.
16	. . . .	18 to 30	36	60 to 80	. . .
18	36 to 48	18 to 30	38	80 to 100	. . .
20	36 to 48	20 to 32	40	80 to 120	60 to 80
22	36 to 50	22 to 34	42	80 to 120	60 to 80
24	36 to 52	24 to 36	44	. . . .	72 to 90
26	40 to 60	26 to 36	46	. . . .	72 to 90
28	40 to 60	. . . .	48	. . . .	80 to 100
30	40 to 60	. . . .	50	. . . .	80 to 100
32	44 to 66	. . . .	52	. . . .	80 to 100
34	44 to 66	. . . .	54	. . . .	84 to 110
36	48 to 72	. . . .		. . . .	. . .
38	48 to 72	. . . .			

Saw Gauges.



Our Standard Gauge.

Gauge.	Fraction Inch.	Thousandths Inch.	Millimeters.
1	$\frac{5}{16}$ Scant	.300	7.62
2	$\frac{9}{32}$	.284	7.21
3	¼ Full	.259	6.57
4	$\frac{15}{64}$	.238	6.04
5	$\frac{7}{32}$	.220	5.59
6	$\frac{13}{64}$	.203	5.18
7	$\frac{3}{16}$ Scant	.180	4.57
8	$\frac{11}{64}$ Full	.165	4.19
9	$\frac{5}{32}$ Scant	.148	3.76
10	$\frac{1}{8}$ Full	.134	3.40
11	$\frac{1}{8}$ Scant	.120	3.05
12	$\frac{7}{64}$	.109	2.77
13	$\frac{3}{32}$	.095	2.41
14	$\frac{5}{64}$ Full	.083	2.10
15	$\frac{5}{64}$ Scant	.072	1.82
16	$\frac{1}{16}$ Full	.065	1.65
17	$\frac{1}{16}$ Scant	.058	1.47
18	$\frac{3}{64}$	.049	1.24
19	.....	.042	1.06
20	.....	.035	.89
21	$\frac{1}{32}$	.032	.81
22	.....	.028	.71
23	.....	.025	.64
24	.....	.022	.56
25	.....	.020	.51
26	.....	.018	.46
27	$\frac{1}{64}$	.016	.41
28	.....	.014	.36
29	.....	.013	.33
30	.....	.012	.30

Inserted Point Saws.

Styles B., F. and D.

Diameter.	Thickness.	No. of Teeth in Saw.	Price.	Extra for each additional Gauge (heavier).	Price for Beveling, extra, per Gauge.
12 inch	11 gauge	10	$18.00	$0.17	$0.35
14 "	11 "	10	21.00	.21	.40
16 "	11 "	12	24.00	.25	.50
18 "	11 "	14	27.00	.30	.60
20 "	11 "	16	31.00	.35	.70
22 "	11 "	18	35.00	.45	.80
24 "	11 "	20	39.00	.55	.90
26 "	10 "	22	43.00	.65	1.05
28 "	10 "	24	47.00	.80	1.20
30 "	10 "	24	52.00	.90	1.30
32 "	9 "	28	57.00	1.00	1.40
34 "	9 "	28	62.00	1.20	1.55
36 "	8 "	30	68.00	1.40	1.70
38 "	8 "	32	73.00	1.75	1.85
40 "	8 "	34	80.00	2.00	2.00
42 "	8 "	34	86.00	2.50	2.20
44 "	7 "	36	95.00	3.00	2.40
46 "	7 "	36	103.00	3.50	2.60
48 "	7 "	from 24 to 40	113.00	4.00	2.80
50 "	7 "	" " " 42	127.00	4.50	3.00
52 "	6 "	" " " 44	148.00	5.00	3.25
54 "	6 "	" " " 46	165.00	6.00	3.50
56 "	6 "	" 30 " 48	190.00	7.00	3.75
58 "	6 "	" " " 50	210.00	8.00	4.05
60 "	5 "	" " " 52	230.00	9.00	4.35
62 "	5 "	" " " 52	250.00	10.00	4.65
64 "	5 "	" " " 54	275.00	12.00	5.00
66 "	5 "	" " " 56	300.00	15.00	5.35
68 "	5 "	" " " 56	325.00	18.00	5.75
70 "	4 "	" " " 58	355.00	21.00	6.15
72 "	4 "	" " " 60	390.00	24.00	6.55

The above list gives the standard number of teeth for different sizes edger and board saws, Style B.

Two extra Shanks, and 100 Points, furnished with each saw 46 inches in diameter and less.

One Wrench, 6 extra Shanks, and 200 extra Points, furnished with each Saw 48 inches in diameter or over.

Extra points, 3 cents each.

Shanks, 30 cents each.

For changing over Solid Tooth Saws into Inserted Point Saws, $1.50 per tooth, plus one-half the list price of solid tooth saw of same size, this price being based on size the saw will cut to, and subject to same discount as Inserted Point Saws.

Inserted Point Saws.

Style H.

Diameter.	Thickness.	No. of Teeth.	Price, each.	Extra for each additional Gauge (heavier).	Price for Beveling, extra, per Gauge.
12 in.	11 gauge	14	$20.00	$0.17	$0.35
14 "	11 "	16	24.00	.21	.40
16 "	11 "	18	27.00	.25	.50
18 "	11 "	20	31.00	.30	.60
20 "	10 "	22	35.00	.35	.70
22 "	10 "	24	40.00	.45	.80
24 "	10 "	28	44.00	.55	.90
26 "	9 "	30	48.00	.65	1.05
28 "	9 "	32	53.00	.80	1.20
30 "	9 "	34	58.00	.90	1.30
32 "	8 "	36	65.00	1.00	1.40
34 "	8 "	38	72.00	1.20	1.55
36 "	8 "	40	80.00	1.40	1.70
38 "	8 "	44	86.00	1.75	1.85
40 "	7 "	46	93.00	2.00	2.00
42 "	7 "	48	100.00	2.50	2.20
44 "	7 "	50	110.00	3.00	2.40
46 "	7 "	52	120.00	3.50	2.60
48 "	7 "	54	130.00	4.00	2.80
50 "	6 "	56	150.00	4.50	3.00
52 "	6 "	60	170.00	5.00	3.25
54 "	6 "	62	200.00	6.00	3.50
56 "	6 "	64	225.00	7.00	3.75
58 "	5 "	66	245.00	8.00	4.05
60 "	5 "	68	265.00	9.00	4.35
62 "	5 "	70	290.00	10.00	4.65
64 "	5 "	72	315.00	12.00	5.00
66 "	4 "	76	340.00	15.00	5.35
68 "	4 "	78	370.00	18.00	5.75
70 "	4 "	80	410.00	21.00	6.15
72 "	4 "	82	450.00	24.00	6.55

The above list gives the maximum number of teeth for different sizes edger and board saws.

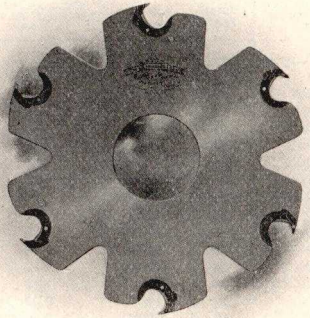
Two extra Shanks, and 100 Points, furnished with each saw 46 inches in diameter and less.

One Wrench, 6 extra Shanks, and 200 extra Points, furnished with each Saw 48 inches in diameter or over.

Extra Points, 3 cents each.

Shanks, 30 cents each.

Rift Saws.



Diameter.	Gauge.	4 Teeth.	6 Teeth.
14	8	$11.50	$14.50
16	8	12.50	15.50
18	8	14.00	17.00
20	8	15.00	18.00
22	8	17.00	20.00
24	8	19.00	22.00

Above list subject to changes as more teeth are added.

Solid Tooth

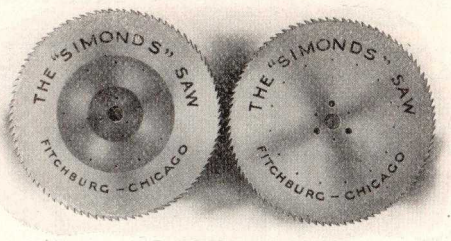
Circular Saws.

Diameter.	Thickness.	Size of Hole.	Price, each.	Extra for each additional Gauge, (heavier.)	Price for beveling new Saws per Gauge.
1 inch.	24 gauge.	⅜	$0.55	$0.01	$.06
1½ "	24 "	⅜	.60	.01	.07
2 "	23 "	⅜	.65	.01½	.08
2½ "	22 "	⅜	.70	.02	.09
3 "	21 "	½	.75	.02½	.10
3½ "	20 "	½	.85	.03	.12
4 "	19 "	¾	1.10	.03	.14
5 "	19 "	¾	1.30	.04	.16
6 "	18 "	¾	1.55	.05	.18
7 "	18 "	¾	1.85	.06	.20
8 "	18 "	⅞	2.20	.08	.22
9 "	17 "	⅞	2.75	.10	.25
10 "	16 "	1	3.30	.12	.28
11 "	16 "	1	3.80	.14	.30
12 "	15 "	1	4.15	.17	.35
14 "	15 "	1⅛	5.00	.21	.40
16 "	14 "	1⅛	6.00	.25	.50
18 "	13 "	1¼	7.50	.30	.60
20 "	13 "	1⅛	9.00	.35	.70
22 "	12 "	1¾	11.00	.45	.80
24 "	11 "	1⅜	13.00	.55	.90
26 "	11 "	1⅜	15.00	.65	1.05
28 "	10 "	1½	17.00	.80	1.20
30 "	10 "	1½	19.00	.90	1.30
32 "	10 "	1⅝	22.00	1.00	1.40
34 "	9 "	1⅝	25.00	1.20	1.55
36 "	9 "	1⅝	28.00	1.40	1.70
38 "	9 "	1⅝	31.00	1.75	1.85
40 "	9 "	2	36.00	2.00	2.00
42 "	8 "	2	42.00	2.50	2.20
44 "	8 "	2	50.00	3.00	2.40
46 "	8 "	2	60.00	3.50	2.60
48 "	8 "	2	70.00	4.00	2.80
50 "	7 "	2	80.00	4.50	3.00
52 "	7 "	2	90.00	5.00	3.25
54 "	7 "	2	100.00	6.00	3.50
56 "	7 "	2	115.00	7.00	3.75
58 "	7 "	2	130.00	8.00	4.05
60 "	6 "	2	145.00	9.00	4.35
62 "	6 "	2	160.00	10.00	4.65
64 "	6 "	2	180.00	12.00	5.00
66 "	6 "	2	200.00	15.00	5.35
68 "	5 "	2	225.00	18.00	5.75
70 "	5 "	2	255.00	21.00	6.15
72 "	5 "	2	290.00	24.00	6.55
74 "	5 "	2	330.00	27.00	7.00
76 "	5 "	2	375.00	30.00	7.50

No extra charge for saws one gauge thicker than list. Circular saws beveled one gauge without extra charge, up to and including 42 inches; 44 inches and larger, beveled two gauges without extra charge.

Circular Saws 48 inches and larger, if made thinner than 10 gauge, add 10 per cent. for each gauge thinner. These Saws are not warranted.

Shingle and Heading Saws.



Left-Hand Saw. Right-Hand Saw.

30	32	34	36	38	40	42	44 inch.
$32.00	$35.00	$38.00	$42.00	$47.00	$53.00	$65.00	$72.00
46	48	50	52	54	56	58	60 inch.
$85.00	$100.00	$115.00	$135.00	$155.00	$175.00	$195.00	$215.00

No warranty on Shingle Saws thinner than 16 gauge.

How to Order Shingle Saws.

In ordering Shingle and Heading Saws, state the name of maker of machine, diameter of saw required, and whether the saw is right or left hand; number of teeth preferred, thickness by gauge on rim. If put on with screws, send one of each size to us, or mark off on paper exact size of screw, so we can drill and countersink saw to fit. We should prefer to have flange sent us; where this cannot be done, send paper impression, *full size* of flange, showing all holes for rivets, screws and mandrel.

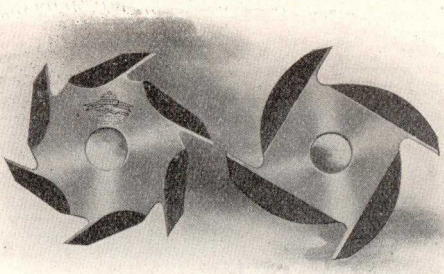
Collars for Shingle, Heading, or Re-Saws.

Cast Iron Flanges, 12 inches to 28 inches in diameter, $1.50 per inch. Steel Flanges, ⅝ inch thick at center, or less, $1.00 per inch.

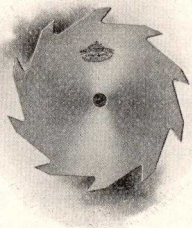
Flanges other than above, special price. Fitting old flange to new saw, $2.00 each, net.

Lock Corner Cutters.

Prices quoted on application.



Grooving Saws.



Diam.	No. of Teeth.	THICKNESS.						
		1/8 in.	5/64 in.	1/4 in.	5/32 in.	3/8 in.	7/32 in.	1/2 in.
4 in.	10	$1.20	$1.40	$1.60	$2.50	$3.50	$4.50	$5.50
5 "	10	1.55	1.75	2.10	3.00	4.00	5.00	6.00
6 "	12	1.90	2.20	2.70	3.50	4.50	5.50	6.50
7 "	8	2.30	2.70	3.30	4.00	5.00	6.00	7.00
8 "	8	2.70	3.20	3.90	4.75	5.75	6.75	7.75
9 "	8	3.30	3.75	4.50	5.25	6.25	7.25	8.25
10 "	10	3.90	4.50	5.10	6.00	7.00	8.00	9.00
11 "	10	4.50	5.10	5.70	6.50	7.50	8.50	9.50
12 "	12	5.10	5.70	6.25	7.50	8.50	9.50	10.50

We have prepared the above list to cover Grooving Saws with the general number of teeth and the general shape of teeth. Where there is any variation from the number of teeth opposite each size saw, and where the tooth is of different shape from the tooth generally furnished, there will be an extra price.

Advance $1.00 for every 1/16 inch in thickness where saws with standard number of teeth are thicker than 1/2 inch.

Re-Sawing or Siding Saws.

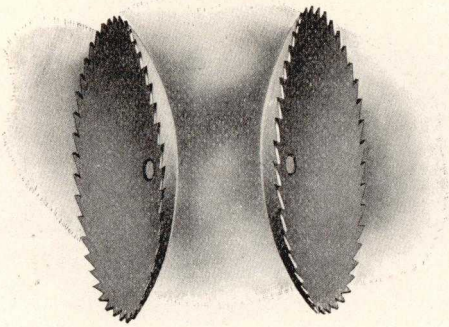
Diameter Inches.	Gauge.	Price.	Diameter Inches.	Gauge.	Price.
16	13 x 17	$7.50	28	9 x 13	$20.60
16	12 x 16	7.75	28	9 x 14	21.80
16	11 x 15	8.00	28	8 x 13	22.60
18	12 x 16	9.30	30	9 x 13	22.90
18	11 x 15	9.60	30	9 x 14	24.20
18	12 x 17	9.90	30	8 x 13	25.10
20	12 x 16	11.10	32	9 x 13	26.20
20	11 x 15	11.45	32	9 x 14	27.60
20	12 x 17	11.80	32	8 x 13	28.60
22	11 x 15	13.40	34	9 x 13	29.65
22	10 x 14	13.85	34	8 x 13	31.20
22	11 x 16	14.20	34	8 x 14	32.75
24	10 x 14	15.70	36	8 x 13	34.80
24	9 x 13	16.25	36	8 x 14	36.50
24	10 x 15	16.60	36	7 x 14	39.60
26	10 x 14	18.15	38	8 x 12	36.55
26	9 x 13	18.80	38	8 x 13	38.40
26	10 x 15	19.20	38	7 x 13	42.00

Note.—Above Re-saws and all Re-saws are figured by taking Solid Tooth Circular Saw List (page 21), and adding extra gauges heavy, and gauges beveling, we allowing one gauge heavier than the standard gauge as appearing in Circular list, and also beveling one gauge on saws 42 inches in diameter and less, and two gauges on saws 44 inch and over, free of charge.

Edger Saws. (Solid Tooth.)

Diameter Inches.	Price.				
	Gauge 8	Gauge 9	Gauge 10	Gauge 11	Gauge 12
12	$5.15	$5.00	$4.85	$4.65	$4.50
14	6.25	6.05	5.85	5.65	5.45
16	7.25	7.00	6.75	6.50	6.25
18	8.70	8.40	8.10	7.80	7.50
20	10.40	10.05	9.70	9.35	9.00
22	12.35	11.90	11.45	11.00	11.00
24	14.10	13.55	13.00	13.00	13.00

Concave Saws.



Left-Hand Saw. Right-Hand Saw.

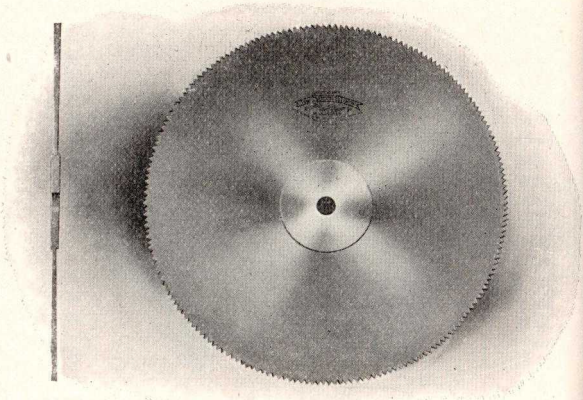
When ordering Concave Saws, give circle to be dished to; also which side is to be dished or concaved, right or left hand, as the saw runs towards you.

4 inch, 16 gauge, $2.20, for each additional gauge, 5 cents extra.

6	"	16	"	2.20,	"	"	"	"	5	"	"
7	"	15	"	2.60,	"	"	"	"	6	"	"
8	"	15	"	3.10,	"	"	"	"	8	"	"
9	"	15	"	3.60,	"	"	"	"	10	"	"
10	"	14	"	4.50,	"	"	"	"	13	"	"
12	"	14	"	5.90,	"	"	"	"	17	"	"
14	"	13	"	7.20,	"	"	"	"	21	"	"
16	"	13	"	9.00	"	"	"	"	25	"	"
18	"	12	"	10.75	"	"	"	"	30	"	"
20	"	12	"	13.50.	"	"	"	"	35	"	"

Saws concaved to a smaller circle than 16 inch, extra price.

Circular Mitre Saws.



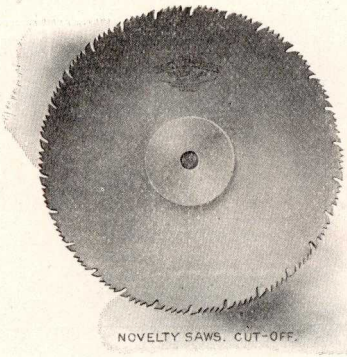
These Saws are ground to run without set, and are especially adapted to smooth cutting, such as cabinet and cigar box work.

Size.	Gauge at Hole.	Gauge at edge of Collar.	Gauge at Teeth.	Extra for each Gauge heavier than list.	Extra for each additional Gauge Beveling.	Price, each.
4 in.	18	21	18	$0.05	$0.14	$2.50
5 "	17	20	17	.06	.16	3.00
6 "	17	20	17	.08	.18	3.50
7 "	16	19	16	.09	.20	4.25
8 "	16	19	16	.12	.22	4.75
9 "	15	18	15	.15	.25	5.50
10 "	15	18	15	.18	.28	6.00
11 "	14	17	14	.21	.30	6.50
12 "	14	17	14	.25	.35	7.00
14 "	13	16	13	.32	.40	7.75
16 "	13	16	13	.38	.50	8.75
18 "	12	15	12	.45	.60	10.25
20 "	12	15	12	.53	.70	12.25
22 "	11	14	11	.68	.80	15.00
24 "	11	14	11	.83	.90	18.00

Above list includes filing teeth, so that saw is ready for use.

The cut shows the way Mitre Saws and Novelty Saws are ground, and the gauge at hole, gauge at edge of collar, and gauge at teeth, are shown in the list.

Novelty Saws.—Splitting and Cut-Off.



NOVELTY SAWS. CUT-OFF.

These Saws are ground the same as Circular Mitre Saws, page 26, and the list prices are the same.

N. B.—Novelty Saws will not cut as fast as saws with ordinary splitting or cutting-off teeth, and their use is not advised, when crowding the work is considered of more importance than smoothness in finish.

Milling Saws for Metal.

Diameter.	Gauge.	Size of Hole.	Number of Teeth.	Price.	Extra for each additional Gauge Heavy.
2 inch.....	22x20	½	48	$1.40	$0.02
3 "	22x20	½	64	1.70	.03
4 "	21x19	¾	76	1.90	.04
5 "	20x18	¾	88	2.30	.05
6 "	19x17	1	96	2.90	.06
7 "	18x16	1	104	3.35	.08
8 "	18x16	1	110	4.00	.10
9 "	17x15	1	116	5.00	.12
10 "	16x14	1¼	120	6.25	.15

If these Saws are fitted, special price.

Circular Saws for Sawing Slate.

Diameter.	Gauge.	Price.	Extra for each Gauge Heavy.
14 inch.	10	$4.25	$0.14
16 "	10	5.25	.17
18 "	9	6 75	.20
20 "	8	7.75	.23
22 "	7	9 50	.30
24 "	6	11.00	.37
26 "	6	12.50	.43
28 "	5	14.25	.53
30 "	5	16 00	.60
32 "	5	17 75	.67
34 "	5	19 50	.80
36 "	4	22.50	.93
38 "	4	25.50	1.17
40 "	4	30.00	1.33

No extra charge for Saws one gauge heavier than named in above list.

Horn and Ivory Saws.

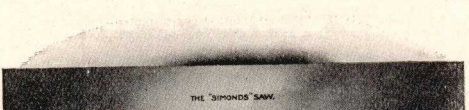
Circular Saws to cut Horn or Ivory, 50 per cent. advance over the price of regular saws.

For Setting and Sharpening Circular Saws.

Diameter.	Splitting.	Cut-Off.	Diameter	Splitting.	Cut-Off.	Diameter	Splitting	Cut-Off.
4 inch.	$ .25	$ .35	28 inch.	$1.20	$1.75	52 inch.	$3.00	$4.40
6 "	.30	.45	30 "	1.30	1.95	54 "	3.00	4.70
8 "	.35	.55	32 "	1.40	2 05	56 "	3.00	5.00
10 "	.45	.65	34 "	1.60	2.35	58 "	3.00	5.30
12 "	.50	.75	36 "	1.70	2.55	60 "	3.00	5.60
14 "	.60	.85	38 "	1.85	2.75	62 "	3.00	6.00
16 "	.65	.95	40 "	2.00	2.95	64 "	3.00	6.30
18 "	.70	1.05	42 "	3.00	3.15	66 "	3.00	6.60
20 "	.80	1.15	44 "	3.00	3.35	68 "	3.00	6.90
22 "	.90	1.30	46 "	3.00	3 60	70 "	3.00	7.20
24 "	1.00	1.45	48 "	3.00	3.80	72 "	3.00	7.50
26 "	1.10	1.60	50 "	3.00	4.10			

All Circular Mill Saws, 42 inch and over, will be swaged (or set), jointed and nicely fitted *ready for use*, except otherwise ordered. All Cut-off Saws, 20 inch in diameter and over, will be filed and set, for which we charge as above.

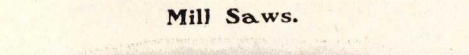
Mulay Saws.



	10 in.	11 in.	12 in. wide.
No. 4 gauge,	$3.15	$3.50	$3.85 per foot.
" 5 "	3.00	3.30	3.50 "
" 6 "	2.75	3.00	3.30 "

	10 in.	11 in.	12 in. wide.
No. 7 gauge,	$2.40	$2.75	$3.00 per foot.
" 8 "	2.20	2.40	2.75 "
" 9 "	1.90	2.20	2.40 "

Mill Saws.

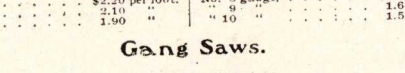


8 inches wide or less.

No. 5 gauge,	$2.20 per foot.
" 6 "	2.10 "
" 7 "	1.90 "

No. 8 gauge,	$1.75 per foot.
" 9 "	1.65 "
" 10 "	1.55 "

Gang Saws.



Nos.	17 & 18 gauge,	4½	in. wide,	$0.85 per ft.
"	15 " 16 "	4½	" "	.85 "
"	17 " 18 "	5	" "	.85 "
"	15 " 16 "	5	" "	.85 "
"	15 " 16 "	6	" "	.95 "
"	13 " 14 "	6	" "	1.00 "
"	15 " 16 "	7	" "	1.05 "
"	13 " 14 "	7	" "	1.10 "
"	14 " 15 "	8	" "	1.15 "
"	12 " 13 "	8	" "	1.20 "
"	10 " 11 "	8	" "	1.20 "

Nos.	9 gauge,	8	in. wide,	$1.40 per ft.
"	8 "	8	" "	1.60 "
"	14 & 15 "	9	" "	1.25 "
"	12 " 13 "	9	" "	1.30 "
"	10 " 11 "	9	" "	1.30 "
"	9 "	9	" "	1.50 "
"	8 "	9	" "	1.70 "
"	14 " 15 "	10	" "	1.40 "
"	12 " 13 "	10	" "	1.45 "
"	10 " 11 "	10	" "	1.45 "

Gang Saws with reversed teeth, 10 per cent. advance.

Tabbing: 4 hole tab, 40 cents; 5 hole, 50 cents, and 6 hole, 60 cents. Wilkin Tab, 80 cents per saw, net; 90 cents per saw, net, when put on.

Where we punch the holes in ends of saw for tabs, and do not furnish tabs, we charge one cent, net, per hole.

If swaged only, add 5 cents per foot to list.

If swaged and fitted, add 10 cents per foot to list.

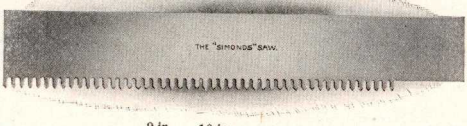
Gang Saw Rivets, 20 cents per pound

Drag Saws of Equal Width.

	8 in.	9 in.	10 in.	12 in. wide.
8 gauge,	$1.65	$1.75	$1.95	$2.20 per foot.
9 "	1.55	1.65	1.85	2.10 "
10 "	1.45	1.55	1.75	2.00 "

Saws over 7 feet long use Lance Tooth List.
In ordering, state whether Mill or Cross-Cut Teeth are wanted.

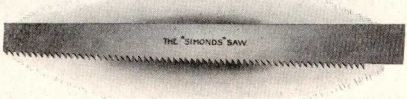
Lance Tooth Drag Saws.



	9 in.	10 in.	12 in.	14 in.	16 in. wide.
5 gauge,				$4.30	$4.85 per foot.
6 "				4.00	4.50 "
7 "			$3.50	3.65	4.20 "
8 "	$2.20	$2.35 per foot.	3.00	3.30	3.85 "
9 "	2.00	2.20 "	2.65	3.00	
10 "	1.75	2.00 "	2.40	2.65	
	1.55	1.75 "	2.20		

Saws over 8 feet long, extra price.

Butting or Drag Saws (Taper).



Tapered 10 in. butt,	8 in. point,	No. 8 gauge,	$1.60 per foot.
" 10 " "	8 " "	" 9 "	1.55 "
" 9 " "	7 " "	" 8 "	1.50 "
" 9 " "	7 " "	" 9 "	1.45 "
" 8 " "	6 " "	" 10 "	1.25 "
" 8 " "	6 " "	" 11 "	1.20 "
" 7 " "	5 " "	" 10 "	1.15 "
" 7 " "	5 " "	" 11 "	1.10 "
" 7 " "	5 " "	" 12 "	1.05 "

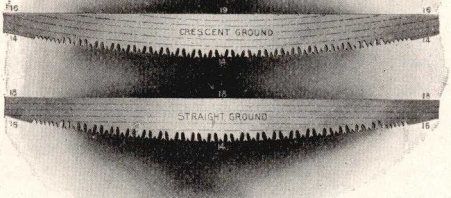
Five cents, net, per foot extra, when filed or set.
In ordering, state whether Mill or Cross-Cut Teeth are wanted.

Instructions for Ordering.

When ordering *Gang, Mill or Mulay Saws*, give length and width of saw, also thickness by gauge, space or distance of tooth from point to point, and distance from top of saw to first tooth; also distance from bottom of saw to last tooth. Where Mulay, Mill or Drag Saws are to be drilled, patterns should be sent showing size and position of holes.

In ordering *Gang Saws*, state whether they shall be tabbed or not, and the style of tabs to be used, also the *exact* distance between tabs.

Crescent-Ground Cross-Cut Saws.



We would call especial attention to the improvement in Cross-Cut Saws described herein, and the advantages derived from this method of manufacture.

All Cross-Cut Saws have heretofore been ground in a straight line from end to end, as shown in the cut marked "STRAIGHT GROUND." As a result a saw made 14 gauge thick at the centre of the edge, and beveled to 18 gauge at the back will be but 16 gauge thick at the edge near the end of the saw; or in other words, *the teeth vary two gauges in thickness on the cutting edge*, as shown in the diagram.

The improvement in the Simonds Crescent-Ground Cross-Cut Saw consists in grinding the saw in crescent lines, parallel to the cutting edge, as shown in the cut marked "CRESCENT GROUND," in which case *the teeth are of even thickness throughout the entire length of saw, while the ends are increased two gauges in thickness.* In consequence the saw can be ground thinner on the back, and it does not bind in the kerf as others do. It requires less set, for each tooth does an equal amount of work, and has equal thickness or strength to hold the set required for clearance. Being two gauges heavier and consequently stiffer at the ends, the operators can push as well as pull without causing it to "buckle;" and for felling trees it has been demonstrated that it has no equal in the market.

Crescent-Ground Cross-Cut Saws.

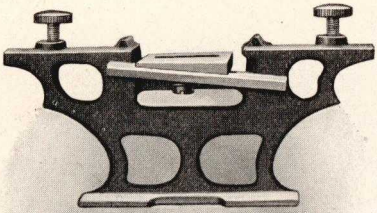
4 feet long,	$2.40 each.
4½ feet long,	2.90 each.
5 feet long,	3.50 each.
5½ feet long,	4.10 each.
6 feet long,	4.80 each.
6½ feet long,	5.50 each.
7 feet long,	6.30 each.
7½ feet long,	7.10 each.
8 feet long,	8.00 each.
8½ feet long,	9.00 each.

We guarantee that the Crescent-Ground Saw will cut *ten per cent. more timber, same labor being used*, than any other brand of saws made in the United States.

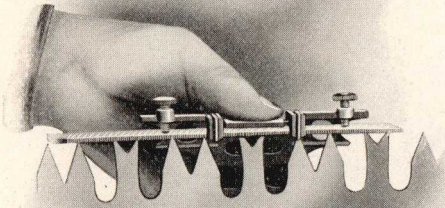
The Simonds Cross-Cut Saw, Crescent-Ground, is now universally known. For many years in use, no saw has ever been returned because our warranty, as above printed, was not fulfilled.

The Simonds Crescent Saw Tools.

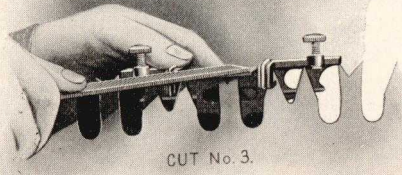
(PATENTED AUG. 29, 1899.)



CUT No. 1.

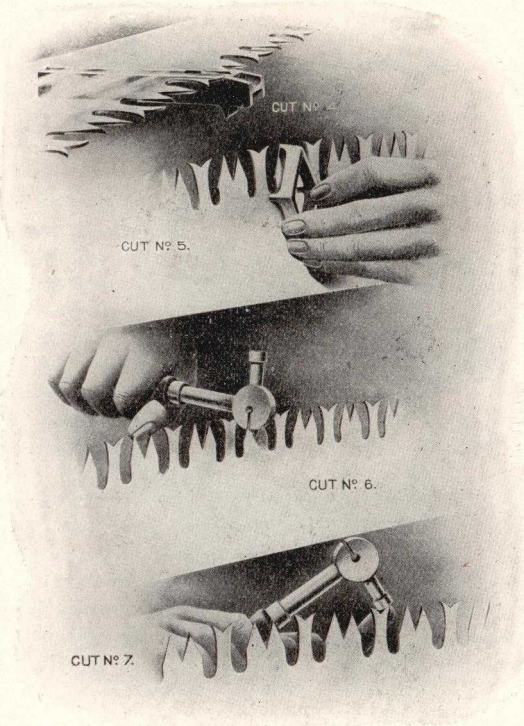


CUT No. 2.



CUT No. 3.

The Simonds Crescent Saw Tools—Continued.



Price, per dozen sets, without hammer,	$9.00
Drop-forged Tool Steel Hammers, per dozen,	4.80

Wide Band Saws.

Our Wide Band Saws are Universally Recognized as
- **More Economical**
- **They Will Cut More Lumber**
- **They Will Hold Their Edge**
- **They Will Hold Their Tension**

Longer **THAN OTHER SAWS.**

Joined and Fitted.

Width.	Usual Gauge.	Price per Foot.
2 inch.	19 to 21	$0.65
2½ "	17 " 20	0.85
3 "	17 " 20	1.05
3½ "	17 " 19	1.25
4 "	16 " 19	1.45
4½ "	16 " 19	1.65
5 "	16 " 19	1.85
5½ "	16 " 18	2.05
6 "	15 " 18	2.25
7 "	15 " 17	2.65
8 "	14 " 16	3.05
9 "	14 " 16	3.45
10 "	14 " 16	3.85
11 "	14 " 16	4.35
12 "	14 " 16	5.00
13 "	13 " 15	6.00
14 "	13 " 15	7.00
15 "	12 " 14	8.50
16 "	12 " 14	10.00
17 "	12 " 14	14.00
18 "	12 " 14	18.00

Band Saws, 2 inches wide and over, thinner than 22 gauge, 20 per cent. advance on above list.

Silver Solder for brazing band saws, 90 cents per ounce.

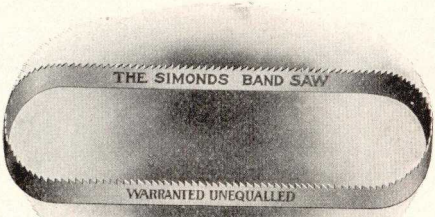
In ordering Band Saws, state length, width, gauge, space of teeth; also whether right or left hand.

Toothed Blanks furnished at same price as finished saws.

Band Saw Blanks furnished, but not warranted.

Double Edge Band Saws, extra price.

Narrow Band Saws.



Width.	Usual Gauge.	No. of Teeth to Inch.	Price per Foot.
1/8	22 or 23	6 or 7	$0.07
3/16	21 or 22	6	.07
1/4	20 to 22	5 or 6	.07
3/8	20 to 22	4 or 5	.08
1/2	20 or 21	3½ or 4	.10
5/8	20 or 21	3, 3½ or 4	.12
3/4	20 or 21	2½ or 3	.14
7/8	20 or 21	2½ or 3	.16
1	19 to 21	½ or ¾" pt. to pt.	.18
1¼	19 to 21	"	.23
1½	19 to 21	1 or 1¼" pt. to pt.	.28
1¾	19 to 21	"	.34

SETTING AND FILING.—4 cents per foot, less same discount as on Narrow Band Saws.

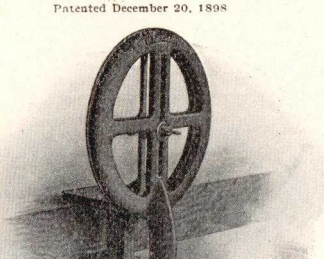
BRAZING.—½ in. and less, 20 cents; ⅝ in. to ⅞ in., 25 cents; 1 in. to 1¼ in., 30 cents; 1½ in., 40 cents; 1¾ in. to 2 in., 75 cents.

Prices for Brazing are net.

In ordering, state length, width and gauge; and whether brazed, set and filed

The Fernside Circular Saw Clamp.

Patented December 20, 1898



This Clamp is easily adjusted for any size circular saw from 4½ to 18 inches in diameter.

It gives perfect rigidity.

The operator can make a perfectly smooth tooth.

The wear and tear on both saw and file are reduced to a minimum. All vibration is prevented by the rubber cushion.

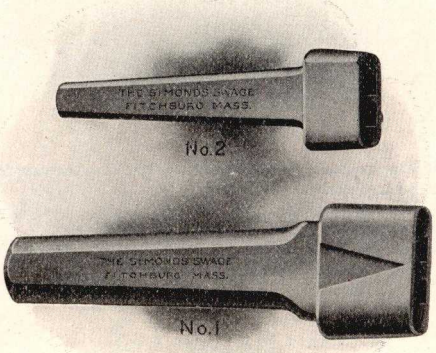
Price. $5.00 each.

Saw Makers' Tools.

Anvils, Hammers and Straight Edges.

Saw Makers' Anvils,	18 cts. per lb.
" " Hammers,	75 " "
Straight Edges,	$1.50 per foot.

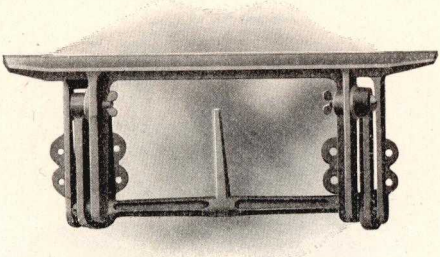
Swages or Upsets.



Simonds Swage, No. 1, for Saws 10 gauge and heavier,	$2.75	$3.50
" " No. 2, " " 11 " " lighter,	2.25	2.50
" " (Special) for Wide Band Saws,	2.25	2.50

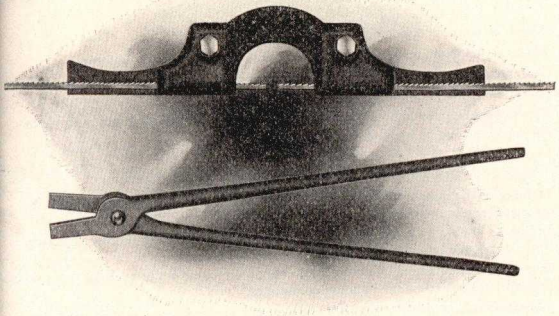
Postage on No. 1 Swage, 17 cents.
" " No. 2 " 8 "
" "Special " 8 "

Improved Saw Filing Clamp.



The above cut represents the latest Improved Saw Filing Clamp. It is especially adapted for filing Band, Hand and any other saws, from $\frac{1}{8}$ to 7 inches in width The jaws being 23 inches long, allow a large section of the saw to be held in position for filing, thus saving a large percentage of time in sharpening saws.

Price, ... $5.00

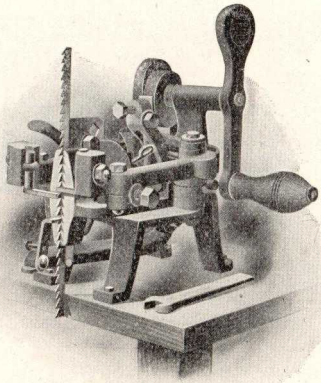


Band Saw Brazing Clamps, ... Price, $2 00 each

Band Saw Brazing Tongs, ... " 2 00 "

Patent Band Saw Setting Machine.

Patented Oct. 20, 1896



Simple in construction. Easy to operate.

Blade set without removing from machine, or at the bench, as desired.

One spring throws two hammers which simultaneously strike the teeth in opposite directions with equal force.

The saw passes through a spring-pressed vise which holds it firmly, but yields readily when the saw is fed or drawn upwards.

Some Reasons Why This Excels all Others.

Striking teeth in opposite directions with hammers of equal force keeps the blade straight and gives very even set.

In this set the teeth do not strike an anvil, therefore the cutting part of the tooth is neither dulled nor injured.

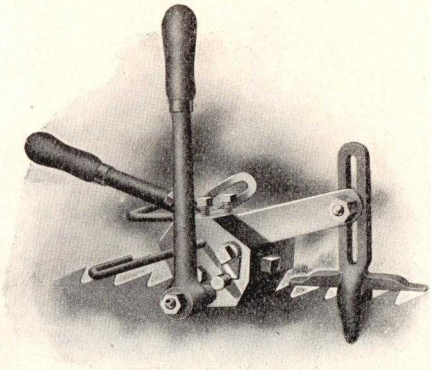
It gives much evener set than where the tooth is pressed or crowded, as it is less liable to spring back when the pressure is removed.

The machine is so constructed that the operator can see the amount of set given, and by simply turning a thumb screw can regulate the force of the blow or the amount of set desired.

This machine will set an ordinary saw in from three to five minutes.

PRICE, ... $15.00.

Hanchett Hand Swage.

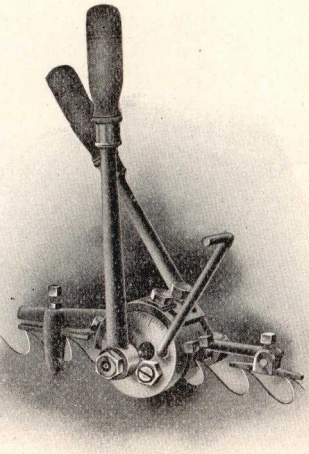


Style A3.

The above cut illustrates the Hanchett Hand Swage for Band or Gang Saws. When ordered for use on gang saws, a fork is furnished that has no forward projection, thus making it more convenient for swaging the last teeth at lower end of saw. For band saws, it is furnished as shown in cut. It is made in three sizes.

No. 1, for saws 11 to 16 gauge, ...	price, $33.00
No. 2, for saws 16 to 20 gauge, ...	" 28.00
No. 3, for saws 19 to 24 gauge, ...	" 28.00

White Standard Swage.



The above cut illustrates the White Standard Swage for Band Saws from 12 to 16 gauge. Any shape of band saw teeth in use can be swaged with this swage by properly adjusting the die and anvil.

Price, ... $35.00

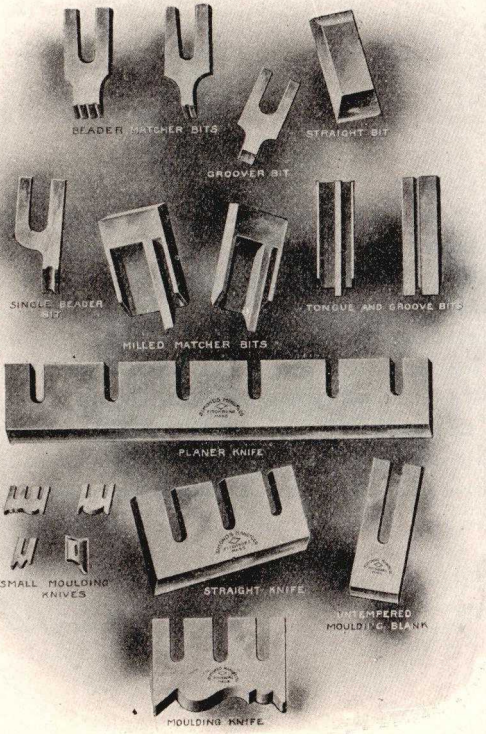
Machine Knives.

We can give any required temper for any work a Knife has to do, and can continue to give a temper, which has proved right, on all further orders. We have reduced this part of our business to a nicety and precision which enables us to please the most exacting. The manufacture of Knives has become with us a scientific problem, the "hit or miss" method of old having been done away with altogether.

On the succeeding pages will be found illustrated some of the many varieties of Knives which we manufacture. Prices of any kind of Machine Knives will be quoted on application.

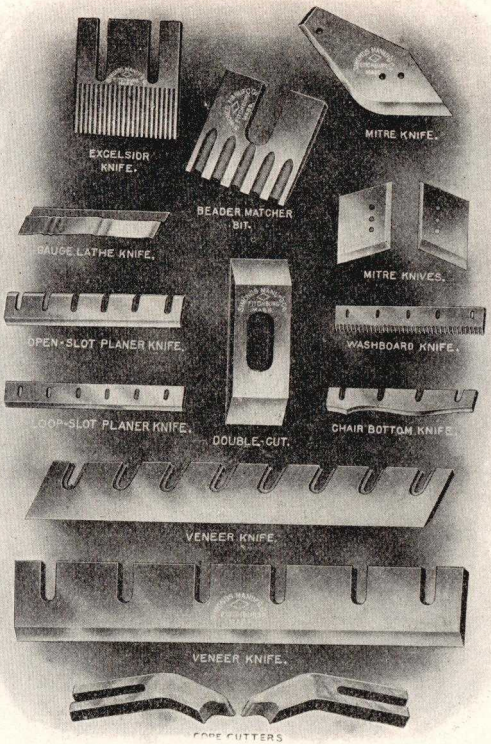
KNIVES

for Planing and Moulding Mills, Box Factories, etc.



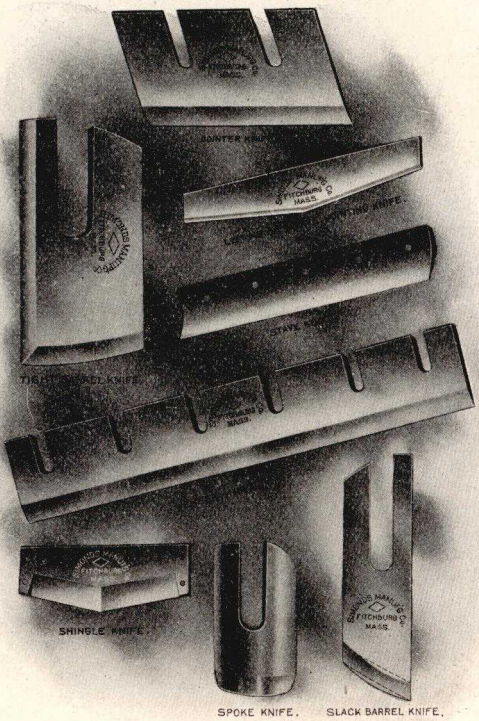
KNIVES

for Furniture and Veneer Factories.



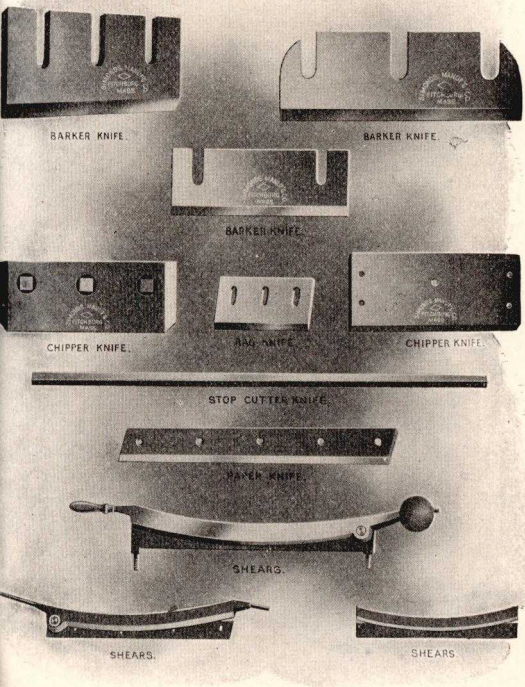
KNIVES

for Coopers and Barrel Manufacturers.



KNIVES

for Paper and Pulp Mills, Paper Box Makers, Bookbinders and Printers.



C. A. HACK & SON, PRINTERS, TAUNTON, MASS.